

COMMUNICATIONS INC.

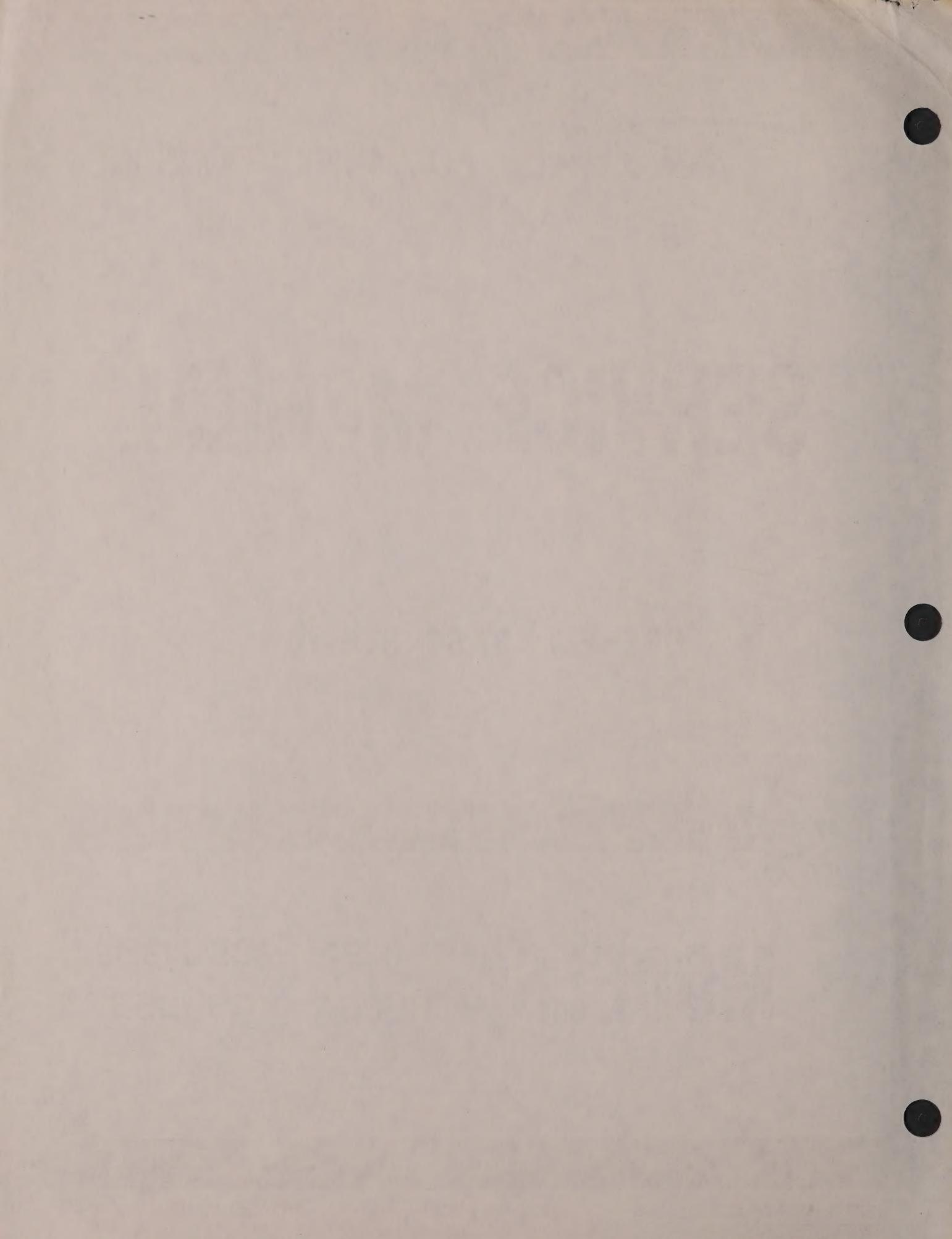
SERVICE MANUAL

UHF-FM BASE STATION



MODELS MCBU19A; MCBU19B
MCBU35A; MCBU35B





MCBU SERIES SERVICE MANUAL

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SECTION 5

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SECTION 1 GENERAL INFORMATION

1-1 DESCRIPTION

The Microcom BU35 and BU19 are base station transceivers designed for use in the UHF (450-512 MHz) communications band. The MCBU35 has an RF power output of 35 watts and includes a 12-hour clock and VU Meter. The MCBU19 is similar to the MCBU35 but has a power output of 15W and the clock and VU Meter are excluded. Both models are capable of 1,2,3 or 4 channel operation (jumper selectable). The transceivers are all set to four-channel operation from the factory. As with the MCU34, the MCBU35/19 models are split into two frequency ranges (or bands). The MCBU35A/19A operate from 450-476 MHz while the MCBU35B/19B operate from 470-512 MHz.

The transmitter and receiver sections can be tuned independently allowing different transmit and receive frequencies. The maximum frequency spread for the receiver is $\pm .75$ MHz (1.5 MHz difference between highest and lowest frequencies) and the maximum spread for the transmitter is ± 3 MHz (6 MHz difference between highest and lowest frequencies). When both receiver and transmitter tune up within these limits, no performance degradation will be observed. However, if a wider transmitter bandspread is desired the broadband tuning procedure must be followed.

The receiver is a double-conversion, super-heterodyne type receiver. Silicon transistors and integrated circuits are used, which provide compactness and higher reliability under varying ambient conditions. A crystal first IF filter and ceramic second IF filter are used to provide for optimum performance where many closely-spaced channels are active.

The transmitter uses direct frequency modulation. An internal adjustment for deviation adjustment is factory set for ± 5 KHz deviation in conformance with FCC Regulations. The power amplifier uses rugged RF power transistors for reliability and has a VSWR protection circuit to protect against damage that can occur if transmitting into an open or shorted antenna. Attenuation of spurious emissions, RF power output, frequency stability, performance under varying ambient temperatures and battery voltages, along with other specifications exceed the limits required by the FCC for transmitter type acceptance.

The 12-hour clock supplied with the MCBU35 can be wired for 24-hour operation. All MCBU35 clocks shipped from the factory are wired as 12-hour clocks.

1-2 SPECIFICATIONS

Transceiver Specifications

Transmitter Output Power Center-Tuned	304-114
Transmitter Output Power Broadband Tuned	304-115
Receiver Sensitivity Performance	304-116
Self-Quieting Spurious	304-122

1-3 EQUIPMENT SUPPLIED

- a. 1 - Base Station Transceiver
- b. 1 - Base Station Microphone
- c. 1 - Owner's Instruction Manual

1-4 EQUIPMENT AVAILABLE (NOT SUPPLIED)

- a. MA-79, MA-126 Telephone Handset
- b. MA-85 Accessory Plug Kit
- c. MA-108 External Speaker
- d. MA-123 TTS Decoder
- e. MA-127 Standard Scanner
- f. MA-128 Open Channel Scanner
- g. MA-129 Priority Scanner
- h. MA-130 Timeout Timer
- i. MA-131 Horn Relay Driver
- j. MA-132 Central Metering
- k. MA-146 CTCSS Two-Call Decoder/Encoder
- l. MA-147 2805 Decoder
- m. MA-163 Audio P.A.
- n. MA-164 CTCSS w/Call Light Circuit
Encoder/Decoder
- o. MA-166 CTCSS Encoder
- p. MA-305 R.F. Preselector
- q. MA-312 Tone Remote Desk Set
- r. MA-313 Tone Remote Adaptor Board
- s. MA-316 Desk Microphone (replacement use)
- t. MA-325 Mic Speech Compressor

1-5 EQUIPMENT NOT SUPPLIED

- a. Antenna
- b. Coaxial Cable Feedline
- c. Coaxial Cable Connector

1-6 INSTALLATION

The MCBU35 and MCBU19 are shipped from the factory for use with 115V AC 60 Hz power sources (although available wired for 220VAC 50 Hz). Place the base station in a location where adequate ventilation is available, and not near heat sources such as radiators, etc.

Connect the desk microphone to the microphone connector, located under the speaker (on power supply chassis). Connect antenna via coaxial cable feedline.

**NOTE: ANTENNA MUST BE PROPERLY ADJUSTED FOR THE 50 OHM
OUTPUT OF THE TRANSCEIVER OTHERWISE A HIGH VSWR WILL
REDUCE THE EFFECTIVE RADIATED POWER OR EVEN CAUSE
THE VSWR PROTECTION CIRCUIT TO SHUT OFF THE TRANS-
MITTER ENTIRELY.**

A three-pin connector to the left of the RF power amp's heatsink provides a connection for an external speaker. The remaining twelve-pin connector has no wiring installed and is provided for user's convenience to connect various special functions or accessories. Regency's MA-85 kit provides all necessary items for wiring this connector.

1-7 OPERATION

When power is first applied to the transceiver (MCBU35 only) the clock display will flash warning the user of an interruption of AC power. To set the clock: Turn on the radio and press the SPVR (supervisory) button and A (Option A) button simultaneously to set hours and press the SPVR button and B (Option B) button simultaneously to set minutes.

With the radio on, the volume should be adjusted to a comfortable listening level (Sq. control fully clockwise). When carriers are not present, adjust the squelch control until the receiver squelches (no noise from the speaker). Note that with the receiver squelched all the VU Meter LED's are out (MCBU35 only). Also, whenever a carrier is not present, the busy lamp is out indicating that the channel is not active.

To select a channel simply press the CH (channel) button to step through to the desired channel. The four buttons to the left of the channel button are (from L to R): INT (intercom), SPVR (supervisory), A (Option A), and B (Option B). All four of these buttons set and reset latches, i.e. push once to set the function and again to reset the function. The INT and SPVR functions only are active when the Remote Adapter Board (MA-313) is installed in the base station. The INT function will also disable the transmitter from operating when the function is set (LED is lit).

To transmit, push the transmit bar on the desk microphone. The transmit LED will light and when the operator speaks into the microphone the VU Meter will give a visual indication of the transmitter's modulation deviation (MCBU35 only).

If a decoder option is installed, the monitor bar on the microphone is used to open the squelch to allow the user to monitor transmissions on that frequency. Releasing the bar activates the decoder again and the receiver is squelched.

1-8 CRYSTAL SPECIFICATIONS

Miniature plug-in crystals are used in both the receiver and transmitter.

When ordering crystals specify:

1. The crystal part number
302-539 Transmit crystal
302-540 Receive crystal

2. The exact channel frequency required.

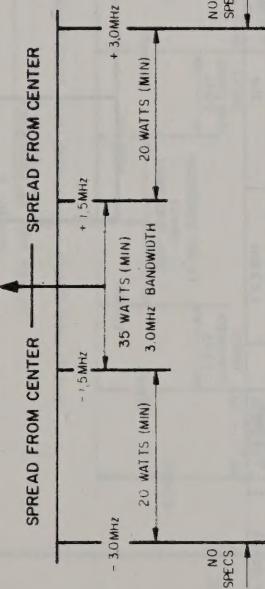
Crystal specifications are shown on the following pages.

No	GENERAL	NOMINAL	GUAR	REVISIONS				APPROVED
				ZONE	REV	DESCRIPTION	BY	
				C	REDRAWN	AB 405	LLV 12/3/80	298
1	CHANNELS	1/4						
2	FREQ. RANGE	450-512 MHz 2 BANDS						
3	OPERATING TEMP	-30°C TO +60°C						
4	OPERATING DUTY CYCLE	EIA INTERMITTENT 4 MIN 6-1/2 MIN 1/8 CYCLE						
5	SIZE (W-D-H)	6-1/2" X 11-3/8" X 6-7/8"						
6	WEIGHT (INSTALLATION)	4-3/4 LB	2.15 KG					
7	POWER	13.6V DC						
	CURRENT DRAIN	@ 13.6V DC						
8	RCVR SQUELCH	180 MA *						
9	RCVR MAX. AUDIO	800 MA *						
10	TRANSMIT	10.25W (ADD 600 MA BELOW 0°C)						
11	ANTENNA	50 Ω						
12	CHANNEL SPACING	25kHz						
No	RECEIVER	NOMINAL	GUAR	NO	RECEIVER	NOMINAL	GUAR	NO
13	SENSITIVITY			29	AUDIO OUT PWR (MAX)			TRANSMITTER
14	20 dB SINAD	.4UV	.5UV (MAX)	30	SQ BLOCKING			NOMINAL
15	THRESHOLD	.20UV	.25UV (MAX)	31	RCVR ATTACK TIME			GUAR
16	TIGHT	.55UV	.7UV (MAX)	32	RCVR SQ CLOSING			TRANSMITTER
17	CTCSS			33	HUM & NOISE RATIO			NOMINAL
18	ADJ CH SEL 200B	120dB	100dB (MIN)	34	UNDESIRED CONDUCTED (AC)			GUAR
19	ADJ CH. DESEN 120B	83db	80db (MIN)	35	UNDESIRED CONDUCTED (RF)			TRANSMITTER
20	OPERATING BANDWIDTH	±750kHz FROM CTR SEE 304-116		40	PWR OUTPUT	40W/20W	35W/15W (MIN)	NOMINAL
21	SPURIOUS & IMAGE	85db	80db (MIN)	41	DC PWR IN TO FINAL			GUAR
22	IM 20dB Q			42	OUT FREQ STAB (TEMP)		±0.005% (MAX)	TRANSMITTER
23	IM 12 dB SINAD			43	IM 650MHz, 100dB, 100dB			NOMINAL
24	MAB	±6.5kHz	±7.5kHz (MAX)	44	IM 650MHz, 100dB, 100dB			GUAR
25	FREQ STAB TEMP.		±.00005% (MAX)	45	IM 650MHz, 100dB, 100dB			TRANSMITTER
26	FREQ STAB VOLTAGE		±.0001% (MAX)	46	IM 650MHz, 100dB, 100dB			NOMINAL
27	AUDIO RESPONSE		EIA 2-8.6dB/OCT DE EMPHASIS	47	IM 650MHz, 100dB, 100dB			GUAR
28	AUDIO OUT PWR (MAX)		4.4W % DISTORTION	48	IM 650MHz, 100dB, 100dB			TRANSMITTER
				49	IM 650MHz, 100dB, 100dB			NOMINAL
				50	IM 650MHz, 100dB, 100dB			GUAR
				51	IM 650MHz, 100dB, 100dB			TRANSMITTER
				52	IM 650MHz, 100dB, 100dB			NOMINAL
				53	IM 650MHz, 100dB, 100dB			GUAR
				54	IM 650MHz, 100dB, 100dB			TRANSMITTER
				55	IM 650MHz, 100dB, 100dB			NOMINAL
				56	IM 650MHz, 100dB, 100dB			GUAR
				57	IM 650MHz, 100dB, 100dB			TRANSMITTER
				58	IM 650MHz, 100dB, 100dB			NOMINAL
				59	IM 650MHz, 100dB, 100dB			GUAR
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				182	IM 650MHz, 100dB, 100dB			GUAR
				183	IM 650MHz, 100dB, 100dB			TRANSMITTER
				184	IM 650MHz, 100dB, 100dB			NOMINAL
				185	IM 650MHz, 100dB, 100dB			GUAR
		</td						

DWG NO 304-114

REVISIONS			DATE	APPROVED
ZONE	REV	DESCRIPTION		
—	A	RELEASE Q-CIG	9-7-78	SO

CHART I
CENTER TIME IN FREQUENCY



5

THE CENTERFREQUENCY SHOULD BE SELECTED TO TUNE THE TRANSMITTER POWER OUTPUT DEGRADATION MAY BE COMPUTED BY FOLLOWING THE STEPS LISTED BELOW AND THE COMPUTATION TABLE TO THE LEFT

STEP 4 - BCF = $\frac{1}{2}(\Delta - \Delta_0)$ CENTER FREQUENCY (Hz)
BCF = SMALLEST $\Delta + \frac{1}{2}(\Delta - \Delta_0)$
BCF = $450.625 + \frac{1}{2}(40\text{MHz} - 2)$
BCF = $450.625 + 2.0\text{MHz}$
BCF = 452.625

IF BCF IS NOT F1, F2, F3 OR F4, CHOOSE CLOSEST VALUE ELSE FOR BCF

STEP 3 - COMPUTE SPREAD FROM CENTER OF EACH FREQUENCY

F2-BCF = 452.125 - 452.625 = -0.5 MHz

13-B2f = 452 823-452 823 = CEINER
14-B2f = 454 625-452 625 = 20 Mhz

STEP 6 - COMPUTE WORST EXPECTED POWER FROM CHART 1

F1 - - 2.2MHz (FALLS BETWEEN 1.5MHz & 3.0MHz) THEREFORE, READ

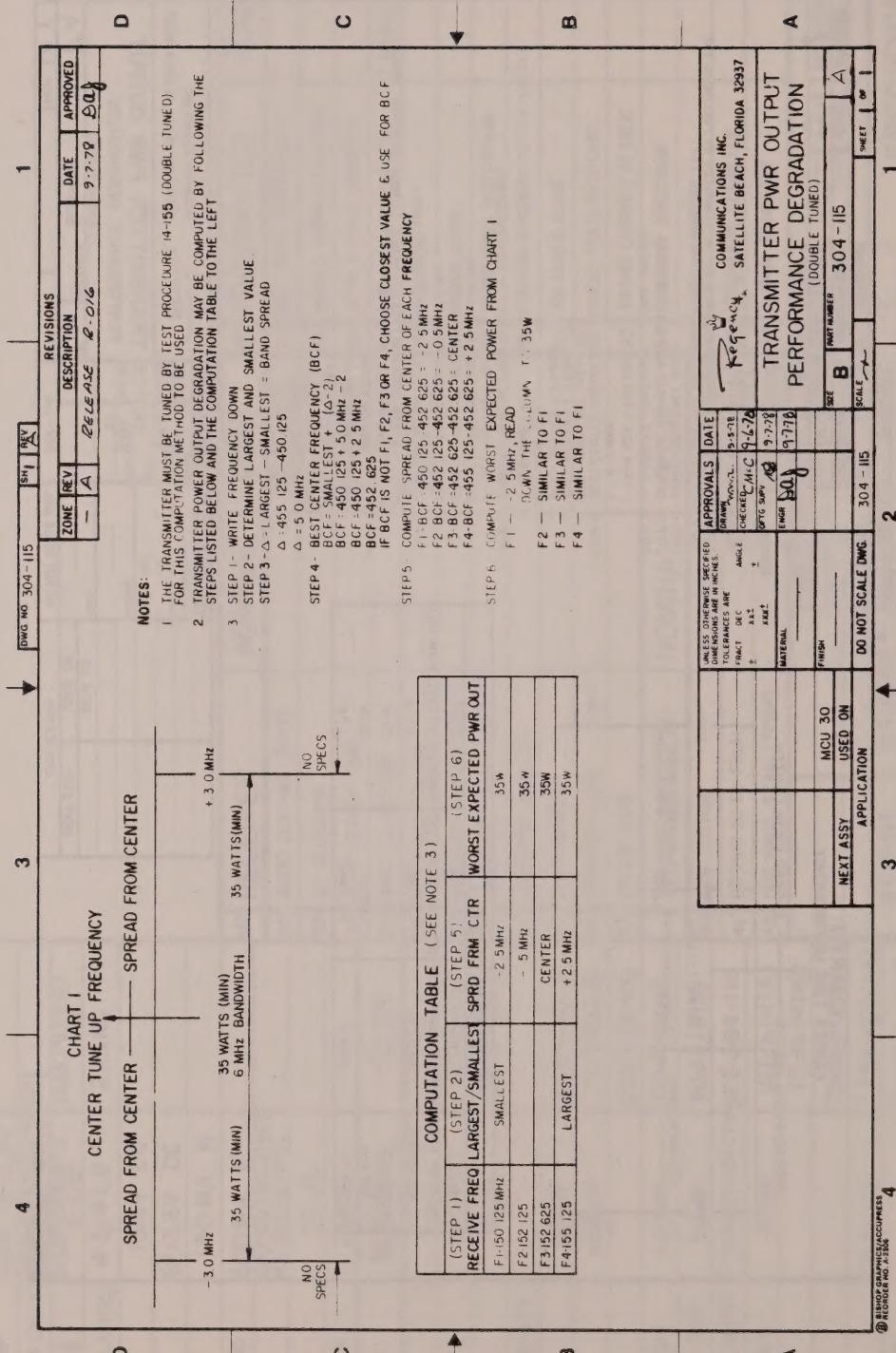
E2 — SIMILAR TO E1
DOWN THE COLUMN TO 20W

F3 — SIMILAR TO F1

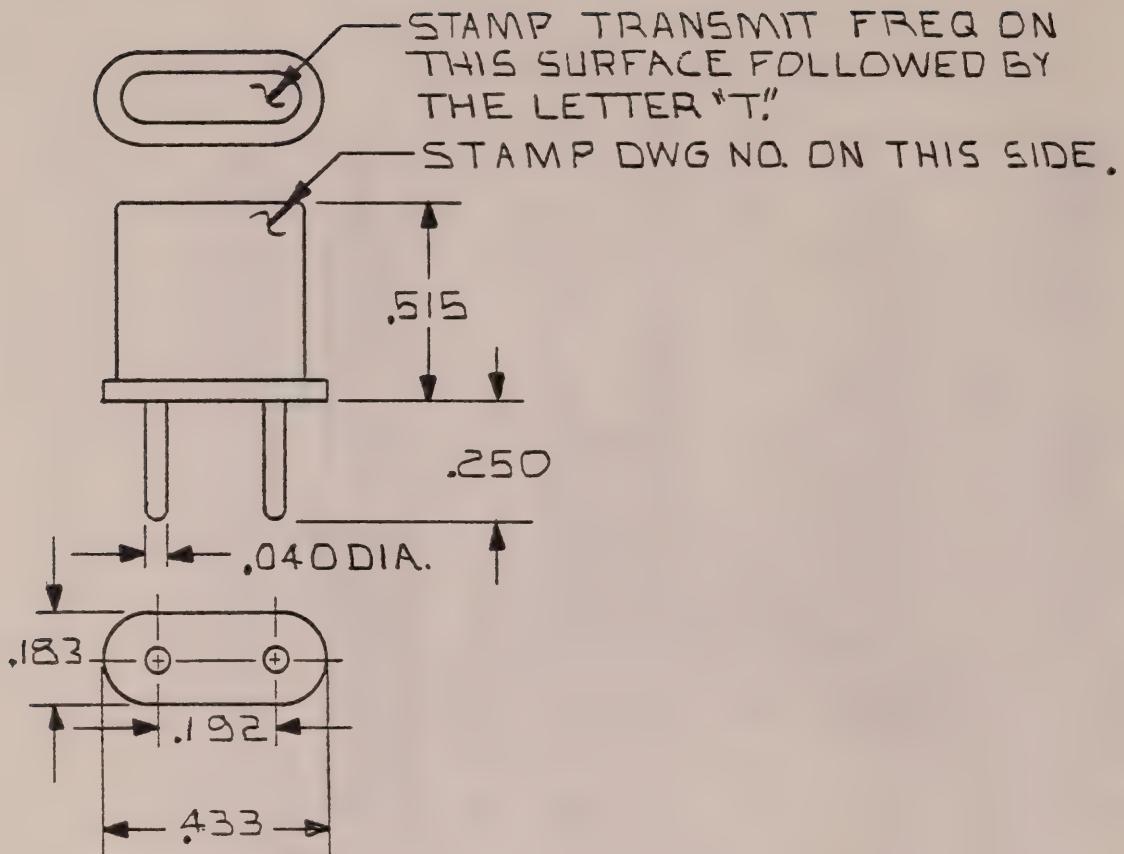
F4 — SIMILAR TO F1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		APPROVALS	DATE
TOLERANCES ARE INCHES		STAN. NO.	9-5-16
FACT		ANGLE	9-6-78
A.C.		CHECKED	4/C
A.M.		DATE	9-7-78
MATERIAL		EDG. FIN.	9-7-78
MCU 30		FINISH	—
NEXT ASSY		USED ON	DO NOT SCALE DWG.
APPLICATION			304-114
REGR. NO.		SEE B	PART NUMBER
COMMUNICATIONS INC.		304-114	
REGENCY		SATELLITE BEACH, FLORIDA 32937	
		TRANSMITTER PWR OUTPUT	
		PERFORMANCE (CENTER TUNED)	
		SHEET OF	
		A	

BISHOP GRAPHICS/ACCUPRINTS
1000 BISHOP DR. SUITE 100
FORT COLLINS, CO 80526



1		3		4		5	
CHART 1		CENTER TUNE UP FREQUENCY		SPREAD FROM CENTER FREQ.		NOTES:	
		<p>1. THE CENTER MOST FREQUENCY SHOULD BE SELECTED TO TUNE THE RECEIVER 2. RECEIVER SENSITIVITY DEGRADATION MAY BE COMPUTED BY FOLLOWING THE STEPS LISTED BELOW AND BY USING THE COMPUTATION TABLE TO THE LEFT.</p>		<p>3. STEP 1 - WHITE FREQUENCY DOWN 4. STEP 2 - DETERMINE LARGEST AND SMALLEST VALUE 5. STEP 3 - D = LARGEST - SMALLEST = BAND SPREAD $\Delta = 451.625 - 451.625 = 0$</p>		<p>6. STEP 4 - BEST CENTER FREQUENCY (BCF) $\text{BCF} = \text{SMALLEST} + (\Delta \cdot \frac{1}{2})$ $\text{BCF} = 451.625 + 0.0 \text{ MHz} \cdot \frac{1}{2}$ $\text{BCF} = 451.625 + 0.0 \text{ MHz}$ $\text{BCF} = 451.625$</p> <p>7. IF BCF IS NOT F1, F2, F3 OR F4, CHOOSE CLOSEST VALUE & USE FOR BCF.</p> <p>8. STEP 5 - COMPUTE SPREAD FROM CENTER OF EACH FREQUENCY $\text{F1-BCF} = 451.625 - 452.625 = -1.0 \text{ MHz}$ $\text{F2-BCF} = 452.125 - 452.625 = -0.5 \text{ MHz}$ $\text{F3-BCF} = 452.625 - 452.625 = 0 \text{ MHz}$ $\text{F4-BCF} = 453.625 - 452.625 = +1.0 \text{ MHz}$</p> <p>9. STEP 6 - COMPUTE WORST QUIETING FROM CHART 1 F1 - 1.0 MHz (FALLS BETWEEN - 750 kHz & - 1.5 MHz) THEREFORE, READ DOWN THE COLUMN TO 3.5 uV F2 - SIMILAR TO F1 F3 - SIMILAR TO F1 F4 - SIMILAR TO F1</p>	
REV. NO. 304-16		REV. NO. 1		REV. NO. 1		REV. NO. 1	
ZONE		REV.		DESCRIPTION		DATE APPROVED	
A		RELEASE R-016		9-7-78		R-016	
COMPUTATION TABLE (SEE NOTE 3)		(STEP 5)		(STEP 6)		(SEE NOTE 3)	
(STEP 1) RECEIVE FREQ		(STEP 2) LARGEST/SMALLEST SINAD		(STEP 3) SPREAD FROM CENTER WORST EXPECTED 12 dB SINAD		(STEP 4) WORST 12 dB SINAD	
F1-151.625 MHz		-10 MHz		3.5 uV		3.5 uV	
F2-152.125 MHz		-.5 MHz		.35 uV		.35 uV	
F3-152.625 MHz		CENTER		.35 uV		.35 uV	
F4-153.625 MHz		LARGEST		+10 MHz		3.5 uV	



CRYSTAL IS A FUNDAMENTAL MODE MOUNTED IN A HC-25/U HOLDER.

NORMAL TRANSMIT FREQ. RANGE: 450-512 MHz

CRYSTAL FREQ.: TRANSMIT FREQ.

LOAD CAPACITY: 32PF ^{3G}

DRIVE LEVEL: 2.0MW

CRYSTAL SERIES RESISTANCE: 25 OHMS MAX.

FREQ. CALIBRATION: $\pm .0015$ @ 25°C

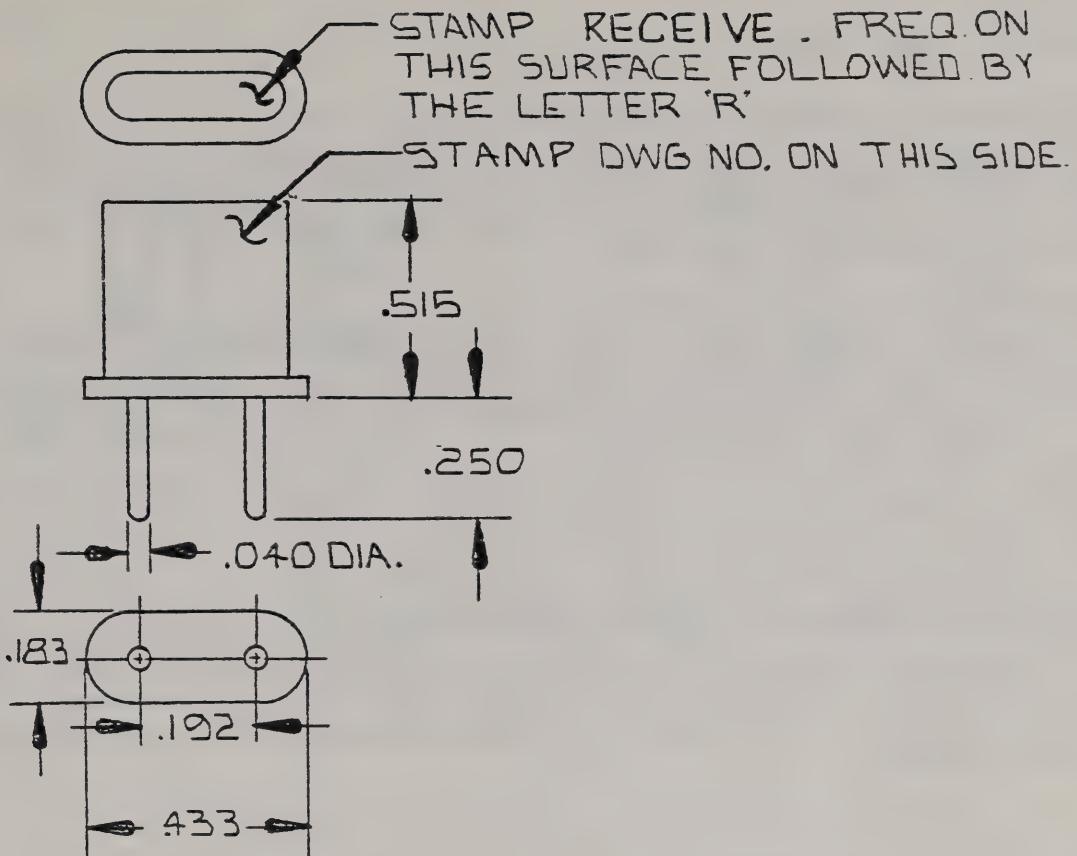
FREQ. TOLERANCE: $\pm .0005\%$ FROM 0°C TO $+60^\circ\text{C}$

$C_1 = .025\text{PF} \pm 10\%$

$C_0 = 5.5\text{PF} \pm 10\%$

CRYSTAL FREQ. RANGE: 12.5 MHz TO 14.23 MHz

TRANSMIT CRYSTAL



CRYSTAL IS A 3RD OVERTONE MODE MOUNTED IN A HC-25/U HOLDER.

NORMAL RECEIVE FREQ. RANGE: 450-512 MHz

CRYSTAL FREQ.: RECEIVER-10.7 MHz CRYSTAL FREQ. RANGE 48.8 to 55.7 MHz.

LOAD CAPACITY: 32PF

DRIVE LEVEL: 2.0MW

CRYSTAL SERIES RESISTANCE: 35 OHMS MAX.

FREQ. CALIBRATION \pm .001% @ 25°C

FREQ. TOLERANCE: \pm .001% FROM 0°C TO +60°C

$C_1 = .0017\text{PF} \pm 20\%$

$C_0 = 5.5\text{PF} \pm 10\%$

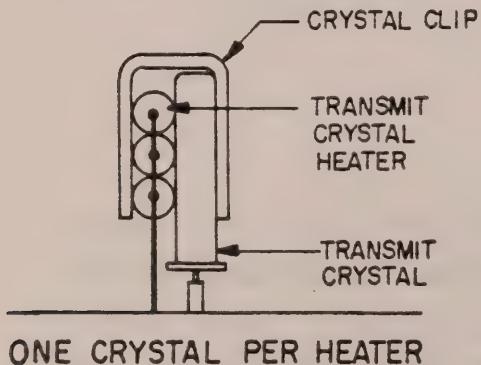
RECEIVE CRYSTAL

1-9 CRYSTAL INSTALLATION

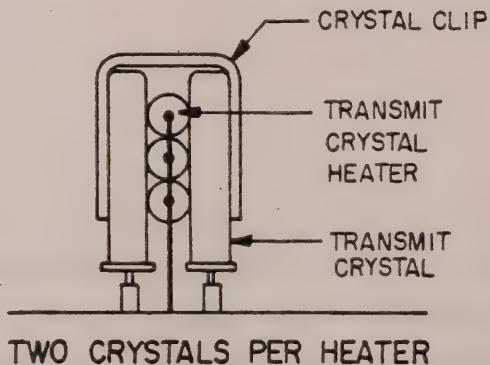
To install transmit or receive crystals the unit will have to be opened. Do this by removing two (2) sheet metal screws from the back of the radio (one in upper left corner; one in lower right corner). Push firmly on the power amplifier's heatsink and the chassis will slide out the front.

Special care must be used when installing the crystals. A crystal heater is used to maintain the transmit frequency within $\pm 2.5\text{ppm}$ of its assigned frequency and the receiver frequency within the AFC range when ambient temperatures vary from -30°C to $+60^{\circ}\text{C}$.

When installing the transmit crystal make sure the crystal body is in contact with the entire heating element. Where there are only two or less channels being used the heating element with the thermistor must be used (chan. positions 1 and 2). After the crystal is seated in the socket, press the crystal clip over the crystal/heater assembly. Use P/N 2830-1420-702, two crystal clip, when two crystals are used in conjunction with a single heater and P/N 2830-1420-701, single crystal clip, when only one crystal is used with a heater. The complete crystal/heater/clip assembly is illustrated below:

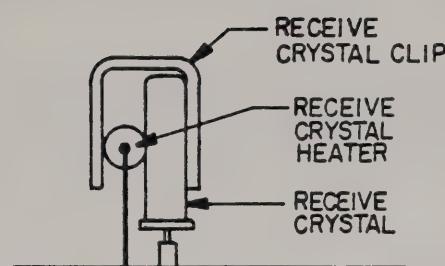


ONE CRYSTAL PER HEATER

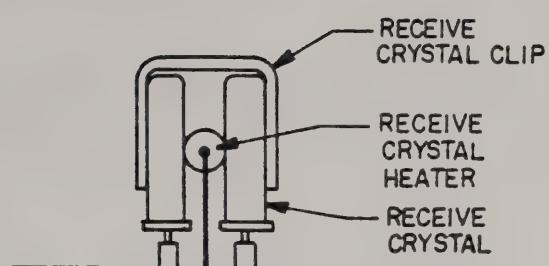


TWO CRYSTALS PER HEATER

When installing the receive crystal, again make sure the crystal makes contact with the heating element. After the crystal is seated in its socket, place the crystal clip over the crystal/heater assembly. Like the transmitter, the receiver crystal clips are P/N 2830-1420-702 for two-crystal clip and P/N 2830-1420-701 for single crystal clip. The complete assembly is illustrated on the following page.

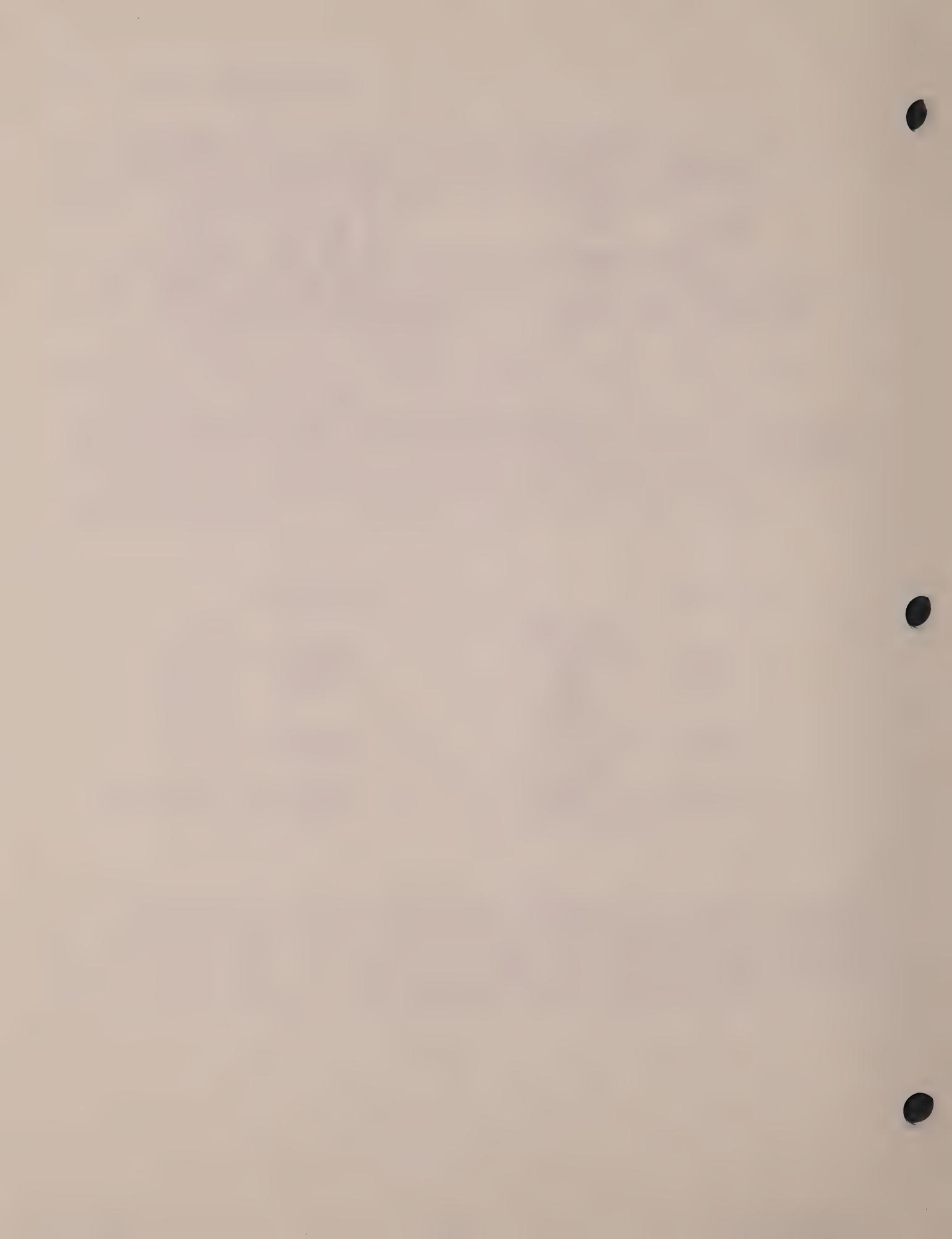


ONE CRYSTAL PER HEATER



TWO CRYSTALS PER HEATER

Refer to receiver and transmitter alignment procedures in this manual for crystal netting.



SECTION 2 CIRCUIT DESCRIPTIONS

2-1 RECEIVER RF FRONT END, 1ST MIXER AND 10.7 IF

The RF amplifier stage, Q203, functions as a common gate, low noise RF amplifier and as a preselector. The amplifier is matched to a two-section helical filter on its input, L205 and L206 and on its output, L212 and L213. The signal then passes to the gate of the first mixer, Q206.

The first local oscillator (L.O.) injection frequency is at a frequency 10.7 MHz lower than the incoming signal frequency. It is obtained from a crystal oscillator-multiplier chain consisting of Q201, Q202 and Q205. The crystal oscillator, Q201, uses a third overtone crystal operating in the 48.8 to 55.7 MHz range and is followed by a buffer-amplifier stage, Q202. The signal is then tripled by the Q205 stage, filtered by the two-section helical filter, L215 and L216, and injected into the source of the J-FET mixer, Q206.

2-2 IF AUDIO CIRCUITS

The output (drain) of the first mixer is a 10.7 MHz IF signal. This signal is filtered by a six-pole bandpass crystal filter (XF201, XF202 and XF203) and is amplified by the Q207 stage before passing to the second mixer (internal to IC201). The second L.O. oscillator, also contained in IC201, operates at 10.245 MHz. At those receive frequencies with a self-quieting problem with 10.245 MHz, the second L.O. frequency is moved to 11.155 MHz. The crystal frequency is stamped on top of the crystal (Y202).

The 455 KHz signal from the second mixer (IC201 Pin 3) is filtered by a 455 KHz bandpass ceramic filter (CF201). The signal is then amplified, limited and detected with a quadrature detector. The adjustable quadrature coil, L220, is across Pins 4 and 8 of IC201.

The demodulated audio signal (Pin 10 IC201) passes to both the audio amplifier circuits and to the noise-operated squelch circuit. The squelch control, R423, adjusts the signal level input to the squelch circuit. The squelch amplifier has a peak response in the 5 KHz to 20 KHz frequency range so it is the noise in this range that activates the squelch. The squelch amplifier output is rectified by CR204 and CR207 to a DC voltage at the input of the squelch switch. When the squelch is closed, this voltage is approximately 0.7 VDC, the squelch switch output is 0 VDC and the audio is squelched with Q204 off. With open squelch or with sufficient carrier present, this voltage is less than 0.7V, the switch output is 8V, Q204 is biased active and the audio passes on to the audio amplifier IC202.

The demodulated audio (Pin 10 IC201) passes through the de-emphasis network (R238 and C245), Q204, the volume control, and on to the audio amp (IC202). The audio amp is capable of delivering 5 watts to the speaker.

2-3 MAIN BOARD, TRANSMITTER

The audio circuit consists of a pre-emphasis network, limiter and post limiter filter. The input from the high impedance, ceramic microphone is both pre-emphasized and amplified by the operational amplifier circuit of IC301A. The limiter, transistors Q307 and Q308, limits the output voltage and prevents over-deviation of the transmitter. The operational amplifier circuit of IC301B is a low pass filter and amplifier. The signal amplitude is adjusted by R328, the deviation control, before passing to the modulator.

The crystal oscillator circuit, Q301, operates at 1/36 the channel frequency, 12.5 to 14.3 MHz. The oscillator frequency is frequency modulated by a varactor diode, CR301A or CR301B, etc. depending on the channel selected.

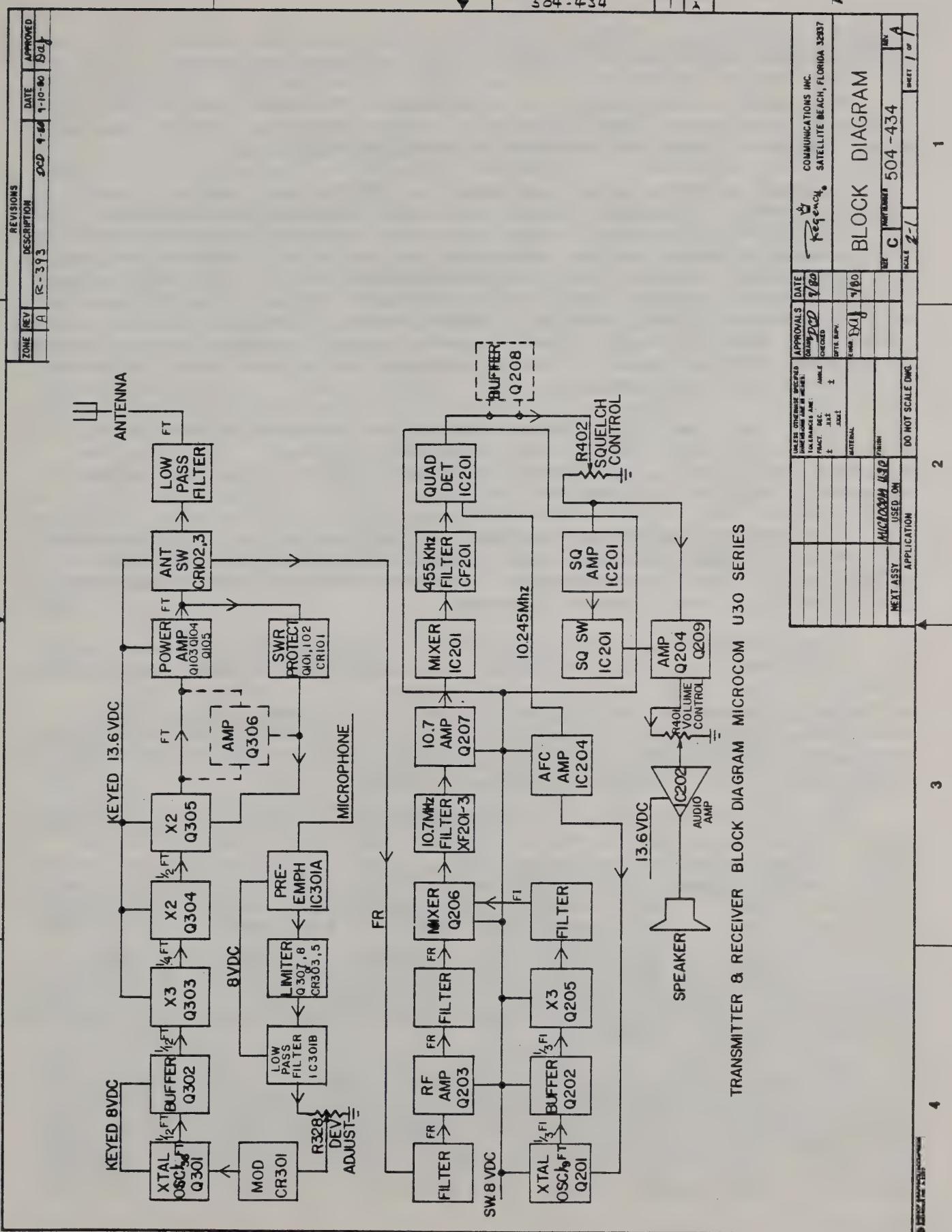
The collector output of the oscillator is tuned to the third harmonic of the crystal frequency and is amplified by the buffer, Q302. The signal is then frequency multiplied by a tripler circuit, Q303, a doubler circuit, Q304, and another doubler circuit, Q305, to reach the 450-512 MHz range. The power output of the main board is 500mw minimum and is sufficient to drive the power amplifier.

The power amplifier chain in the MCBU19 transceiver series consists of Q103 and Q104 and is capable of 15W of output power. The final device, Q104, is VSWR protected.

The power amplifier chain in the MCBU35 transceiver consists of Q103, Q104 and Q105 and is capable of 35W of output power. The final device, Q105, is VSWR protected.

The VSWR protection circuit senses the reflected power at the antenna port due to any antenna mismatch. The sensed reflected power is converted to a DC control voltage which is fed back to the output transistor in the exciter, Q305. Any reduction in the control voltage results in less drive to the power amplifier and thus less RF output power. A directional coupler, formed by CR101, R107 and the plating run between them, senses the reflected power. The signal, rectified by CR101, is amplified to the control voltage by Q101 and Q102.

A transmit-receive switch consisting of PIN diodes CR103 and CR102, the plating run between them, and their bias circuitry switches the antenna between the receiver input and the transmitter output. The-push-to-talk (PTT) switch in the microphone, when depressed, grounds the relay coil, RY301, which switches the 13.6 VDC and 8 VDC from the receive mode to the transmit mode.



TRANSMITTER & RECEIVER BLOCK DIAGRAM MICROCOM U30 SERIES

2-5 CONTROL BOARD DESCRIPTION

The MCBU Control Board is a two-sided PC board mounted by five screws to the front panel assembly. The electrical connections are made via a 5" length of 34 conductor ribbon-cable.

Located on this board are the: ON/OFF/Volume Control, the Squelch Control, the Busy Light Threshold Control (screwdriver adj.) and five push button switches, SW401 through SW405. SW401 is the channel stepping switch which allows sequential channel stepping for up to four channels and is associated with the channel display, CR401, a seven-segment LED display. SW402 controls the "A" option, with associated LED indicator. SW403 controls the "B" option, with associated LED indicator. SW404 controls the intercom feature, with associated LED indicator. SW405 controls the supervisory function, with associated LED indicator.

There is a red LED, CR424, indicating a transmit condition whenever A+ is supplied to the transmitter circuit. Next to the transmit LED there is an amber, busy LED, CR417. This is turned on whenever a carrier is present.

The control board has female pins located so as to accomodate a "VU" Meter Board (MA-309) and a Clock Board (MA-308) for the MCBU35 only. The two male pins, "A7" and "G", are for connecting the wires from the internal speaker.

When the MCBU is first plugged in and turned on, all counters and flip-flops are reset by C405, R418 and CR438 so that all options come up in the "OFF" condition and channel #1 is automatically selected. However, due to the routing of the unswitched +13 VDC line, the transceiver will always retain the same channel and option configuration that was previously selected each time the unit is tuned off and on (barring loss of AC power).

The channel selection is accomplished by a push-button switch, SW401, applying a low to Pin 8 of Nand Gate 404C, forcing Pin 10 high. This is fed to the clock input, Pin 14, of the ripple counter, IC403, which causes it to advance one state (only one output being high at a time). The counter's four outputs are fed to two drivers, IC401 and IC402. IC401 feeds four transistor drivers, Q401 through Q405, which operate a diode matrix to light the channel indicator, CR401. IC401 also sends four signals to the main board to operate diode switches for selecting receiver crystals. The second of these driver chips, IC402, sends its outputs to the main board for selection of the transmitter crystals.

The Option "A" is selected by switch, SW402. This puts a low on Pin 5 of Nand Gate 404B, causing a positive transition at Pin 4 (this gate can be disabled by RIU, Remote In Use, signal being low, or if the ON/OFF switch is off). This positive transistion is fed to Pin 3 of flip-flop 405A, which makes the Q side, Pin 1, go high, turning on Q405, which causes S-12 to go low, picking up a relay on

the interconnect board and also lighting the "A" option LED. The "B" Option works the same way only utilizing gate 404A, flip-flop 405B, Q406 and causing S-13 to go low to pick up its associated relay on the interconnect board.

The SPVR (supervisory) function is selected by depressing SW404, which takes a low from the collector of turned-on transistor Q407, and applies it to Pin 1 of inverter 407A, causing Pin 2 to send a positive transition to Pin 3 of flip-flop 406A, the Q output at Pin 1 goes high, turning on Q410 which lights the "SPVR" LED. This level at Pin 1, (D25), is also sent to the remote adapter board. The "INT" (intercom) selection circuit functions in much the same way, utilizing inverter 407F, flip-flop 406B and driver Q409. The Q output of flip-flop 406B is also the D26 signal out to the remote adapter board. At the same time the \bar{Q} side of flip-flop 406B, Pin 12, going low, holds off Q408 which makes it impossible to put a low on the C5 line and energize the transmit relay. Both the SPVR and INT functions only apply to a base station which uses a MA-313 remote adapter board.

When the press-to-talk switch is depressed, the C7 signal at Pin 3 of inverter IC407B, goes low forcing Pin 4 high. This disables the Busy Light through CR422 and turns on Q408 keying the transmitter. The transmitter may be disabled by being in the intercom mode or by the RIU signal (D25) from the remote adapter board being low. Keyed 13.6V (P2) is used to light the transmit LED.

2-6 POWER SUPPLY DESCRIPTION

The Power Supply is a +13.8 VDC unit with a continuous duty rating of 12 amps. The voltage is adjustable from approximately 12V to 15V by R2107 which has screwdriver access through bottom of unit. Exterior chassis mounted components consist of: microphone connector (front panel), fuseholder and AC line cord (right side), pass transistors Q1 and Q2 (heatsink).

By re-wiring the primaries of transformer T1, the supply may be adapted to 240 VAC as well as 120 VAC, 50-60 cycles (note - for 240 VAC wiring a 1.5A fuse must be used).

The secondary of T1 feeds a full wave rectifier bridge, CR1, which has noise suppression caps (C1 through C4) strapped across all four legs. The unregulated voltage from the bridge is connected to the regulator board at point 3 and also to the collectors of the pass transistors (mounted on the heatsink). The pass transistors are controlled by the current supplied to their bases from the driver transistors Q2101 and Q2102. These driver transistors are controlled by the driver output, Pin 2 of IC2101. The reference for IC2101 is derived from the regulated output (via JU2101) by a voltage divider network R2106 through R2109. Under normal operation the voltage at Pin 6 is 1.75 VDC.

R2105 is paralleled by thermistor RT2101 for temperature stability. External sensing capability is facilitated by removing JU2101 and substituting an external sense to regulator board.

There is also space available in the power supply chassis for the addition of the Speech Amp PC Board (MA-100) and the Tone Remote Adapter Board (MA-313) as shown in the power supply chassis layout (Figure - 1).

2-7 MA-308 12-HOUR CLOCK (MCBU35 ONLY)

The MA-308 clock utilizes the MM5402 12/24 hour clock IC. This chip directly drives four LED displays (CR701-CR704) from Pins 1 through 22, 37, 39 and 40. User selected jumpers are used to select a 12-hour or 24-hour display format.

To convert from 12-hour to 24-hour clock, remove R703 and JU705, and install JU701 through JU704 and JU706. JU706 tells IC701 that 24-hour format is being selected.

The clock for IC701 is derived from IC702, an oscillator/divider IC. The timing element is a 3.579545 MHz crystal. C701 and C702 are selected for the proper frequency which is measured on Pin 7 of IC702. The frequency measured at Pin 7 should be 3.5796 MHz ± 150 Hz.

Each of the displays (CR701 - CR704) is supplied with voltage from a display regulator circuit which eliminates the needs for excessively large dropping resistors.

WARNING: THE HEATSINK FOR Q703 GETS VERY HOT: AVOID CONTACT WITH IT.

The display regulator works by supplying more current as needed by the display (when more segments light up). When more current is demanded by the display the voltage drop across R706 increases. This drop in voltage causes less current to flow through the B-E junction of Q704, which, in turn, allows more current to flow through the B-E junction of Q703 and thereby increasing the current supplied to the display. Because of the limited gain in the circuit it will not perform as a perfect regulator and, therefore, some voltage variation with loading will occur.

For the time-setting functions, the inputs (Pins 34 and 33) of IC701 are controlled by Q701 and Q702, respectively. Pin 34 is the fast-set and Pin 33 is the slow-set. Q701 turns on when the A line (A Option button pressed) and the ENA line (SPVR button pressed) go high, activating the fast-set. Q702 turns on when the B line (B Option button pressed) and the ENA line (SPVR button pressed) go high, activating the slow-set.

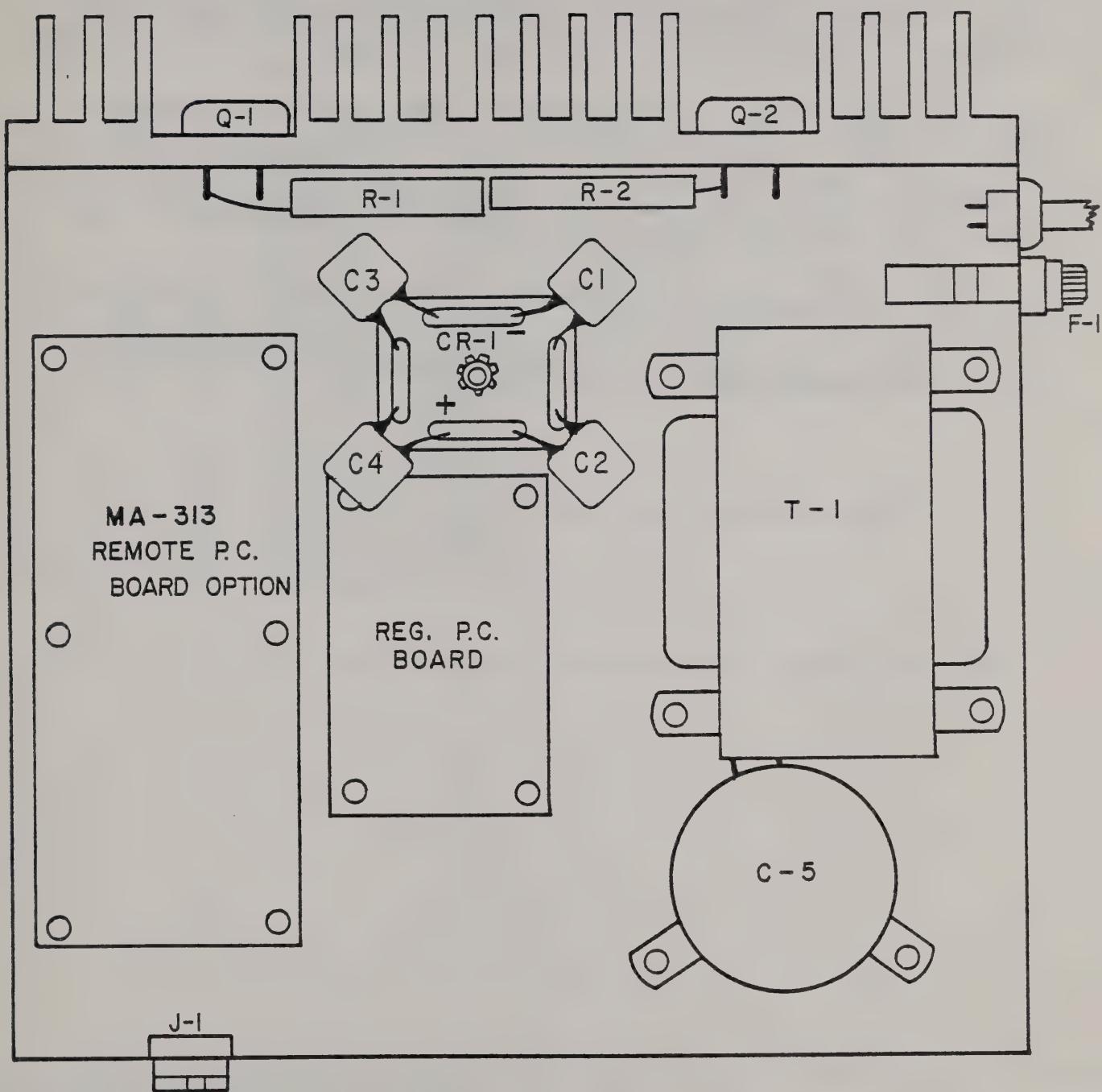


FIGURE 1
POWER SUPPLY CHASSIS LAYOUT

2-8 MA-309 VU METER (MCBU35 ONLY)

The VU Meter circuit has two audio inputs, A4, receiver audio from the volume control and A10, the modulator speech amplifier output. When the transceiver is in the receive mode Q801 is biased on from an external pull-up coming from the PTT input.

The audio from A4 is amplified by Q801 and is fed to IC801 where the analog level is converted to drive the correct number of LED's. On Rev. C meter boards, or later, there is another transistor, Q802, that is turned on by the external pull-up connected to PTT and grounds the A10 input to stop any feedback path this would create from the speech amplifier.

When the PTT line is pulled low (transmit mode) the receive audio amp is biased off and Q802 releases the A10 line (on Rev. C or later boards), which allows the audio from the speech amp to feed to IC801. The LED's light up to reflect the amount of modulation being transmitted.

APPLICATION	
NEXT ASSY	USED ON
	MCBU-35

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	R-250	1-31-80	HDT
B	EN-AB177	6-16-80	HDT

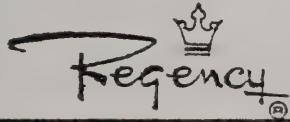
FINAL TEST PROCEDURE - MICRO-COM BU35 SERIES

I. Test Set-Up

A. Equipment

1. MICRO-COM Base Transceiver
2. HP 410 DC VTVM
3. DC Power Supply with Ampmeter. 13.8 VDC 15 Amps.
4. VOM Simpson 360 (Digital)
5. AC VTVM
6. Audio Oscillator
7. Mic matching network
8. 450 MHz ThruLine Wattmeter, 40 dB Power Pad and 50W Element
9. Spectrum Analyzer
10. Deviation Meter*
11. Frequency Counter*
12. Small Blade Tuning Tool and Hex Tuning Tool
13. Tune-Up Crystal
14. Band Reject Filter
15. PTT Switch

*Can be replaced with Cushman or similar equipment

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE		APPROVALS	DATE	 Regency ® COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937
FRACT.	DEC	DRAWN <i>NM</i>	1/30/80	
±	.XX±	CHECKED		
		OFTG. SUPV.		
MATERIAL		ENGR. <i>HDT</i>	1/30/80	TEST PROCEDURE - MICRO-COM BU35 MICRO COM BU19
FINISH		SIZE	PART NUMBER TP14-273	
DO NOT SCALE DRWG.		SCALE	REV. B	
			SHEET 1 OF 9	

Test Interconnection Diagram

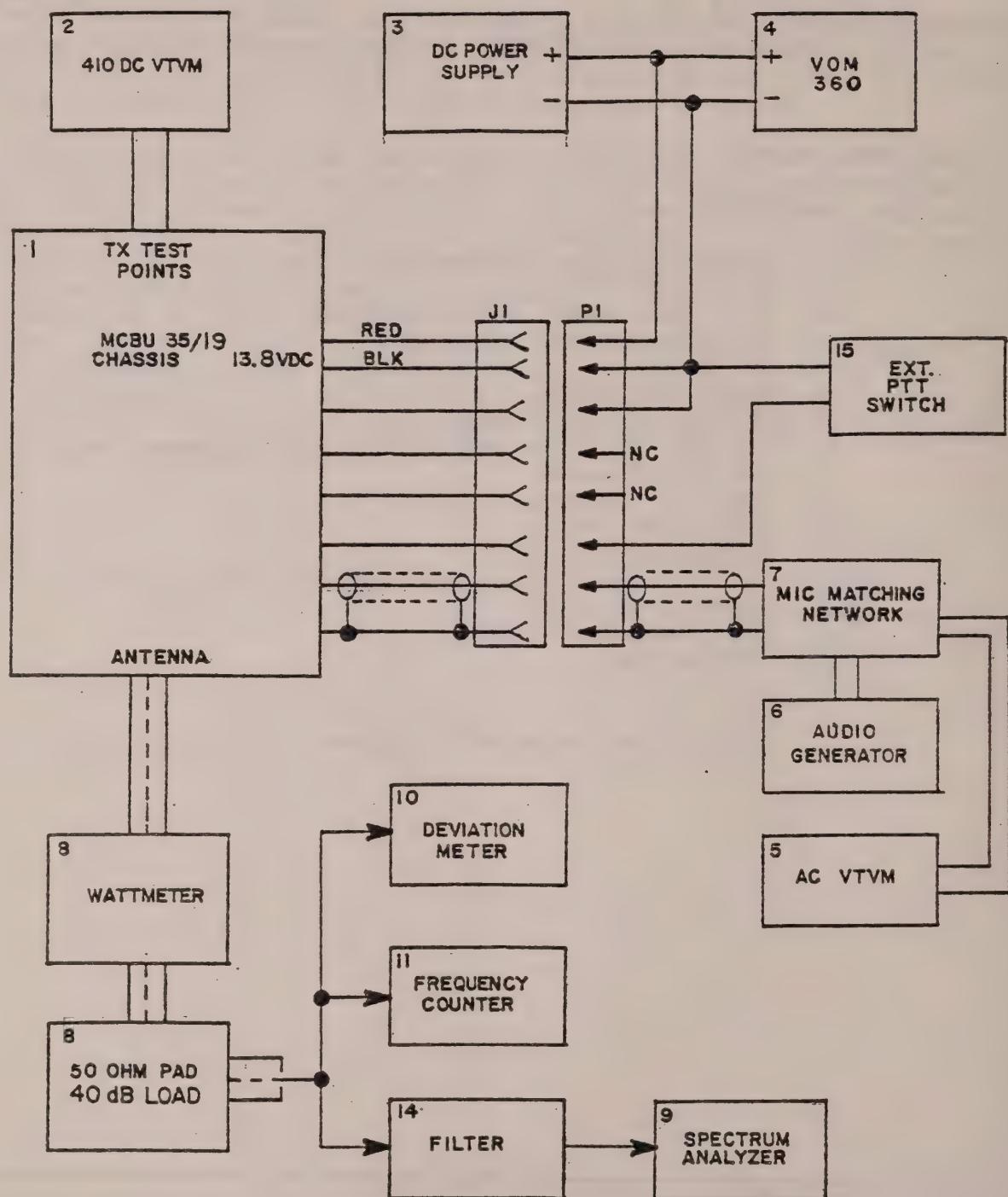


FIGURE 1 - TRANSMITTER TEST SET-UP

DRAWN	SJR	DATE 1-11-80	SIZE	PART NUMBER	REV.
APPROVED	<i>602</i>	DATE 1-30-80	A	TP14-273	B
DO NOT SCALE DWG.		SCALE			SHEET 2

II. Set-Up Instructions

A. Insert tune-up crystal in F1 position. The tune-up crystal is selected as follows:

Freq Range	450-476 MHz	476-512 MHz
Frequency	462 MHz	492 MHz

B. Insert external power connector and set power supply(3) to 13.8 VDC as indicated on VOM(4).

C. Connect wattmeter, 40 dB attenuator(8), band reject filter(14) and spectrum analyzer(9) to antenna connector.

D. Plug P1 into J1.

E. Set channel selector to CH1.

F. Turn on the radio with the ON/OFF volume switch.

III. Tune-Up Procedure

A. VTVM Metering - Set VTVM(2) on 1.5V scale. TP M1 voltage reading is referenced to chassis ground. All others are referenced to keyed 13.8V. Key transmitter with external PTT and key only when measuring or tuning.

1. Monitor M1. Tune L304 and L305 for minimum positive voltage. Voltage should be 0.1V to 0.45V. A reading 0.5V indicates oscillator, Q301, is not oscillating.
2. Monitor M2. Tune L306 and L307 for maximum negative voltage. To find the dip, set coil forms even and tune by alternating one turn on each coil. No dip indicates no drive to Q303.
3. Monitor M3. Tune L310, L311 and L312 for max neg. voltage. No dip indicates no drive to Q304.
4. Monitor M4. Tune L316 for maximum negative voltage. No dip indicates no drive to Q305.

B. Tune C358 on the main board and C112, C131, C132, C121 and C133 on the power amplifier for maximum power out as measured on the wattmeter(8). Power should exceed 35W. Current delivered to the transceiver from the power supply(3) should be less than 1.3A.

C. If channel spacing exceeds 1.5 MHz refer to the broad band tuning procedure, TP14-272.

D. Connect counter(11) to the output of the 40 dB attenuator(8) and set the F1 warp control, L301A, to the nominal crystal frequency +100 Hz.

E. Conducted spurious emissions measurement. Tune band reject filter(14) so that the carrier is not notched and set the

DRAWN		DATE	SIZE A	PART NUMBER	TP14-273	REV. B
APPROVED <u>SDT</u>		DATE 1-30-80				
DO NOT SCALE DWG.		SCALE				SHEET 3

1 4 1 9
TP14-273

spectrum analyzer(9) carrier indication to the 0 dB reference line. Tune the band reject filter to attenuate the carrier at least 30 dB. All harmonics should be 59 dB or more lower than the reference.

F. Deviation adjustment.

1. Connect audio generator(6) to microphone input. Set the generator for 1 KHz at 1 VAC. Connect the deviation meter(10) to the attenuator(8) output.
2. Key the transmitter and adjust R328 for ± 5 KHz deviation as measured on the meter.

G. Check the modulation sensitivity by reducing the audio generator output until the deviation is ± 3 KHz. The measured generator output on the AC VTVM(5) should be less than 20mv rms.

H. Reconnect the counter(11) to attenuator(8). Insert the crystal in each channel. All channels must be capable of being warped on frequency ± 100 Hz. Repeat G and monitor deviation meter(10) on each channel. Deviation should be ± 4.5 KHz, (± 500 Hz tol.)

I. Crystal heater circuit check. When RT301 is cooled or when DC power is initially applied to the transceiver the collector of Q306 should drop to a maximum voltage of 2 VDC as measured on VTVM(2). After 1 minute this voltage should stabilize around 6 to 8 VDC.

IV. Table of Performance Limits

<u>PARAMETER</u>	<u>MIN</u>	<u>TYP</u>	<u>MAX</u>	<u>UNITS</u>
M1 without xtl - M1 with xtl	.1	.3	.45	Δ VDC
M2 without Xtl - M2 with xtl	1.0	1.7	2.5	Δ VDC
M3 without xtl - M3 with xtl	2.0	3.0	3.25	Δ VDC
M4 without xtl - M4 with xtl	.5	1.1	1.6	Δ VDC
Deviation	-	-	± 5.0	KHz
Mic Mod Sens	-	10	20	mVrms
Collector Q306 cold	-	1.5	2.0	VDC
Tx Power Output	35	40	50	W
DC Current	9	11	13	A

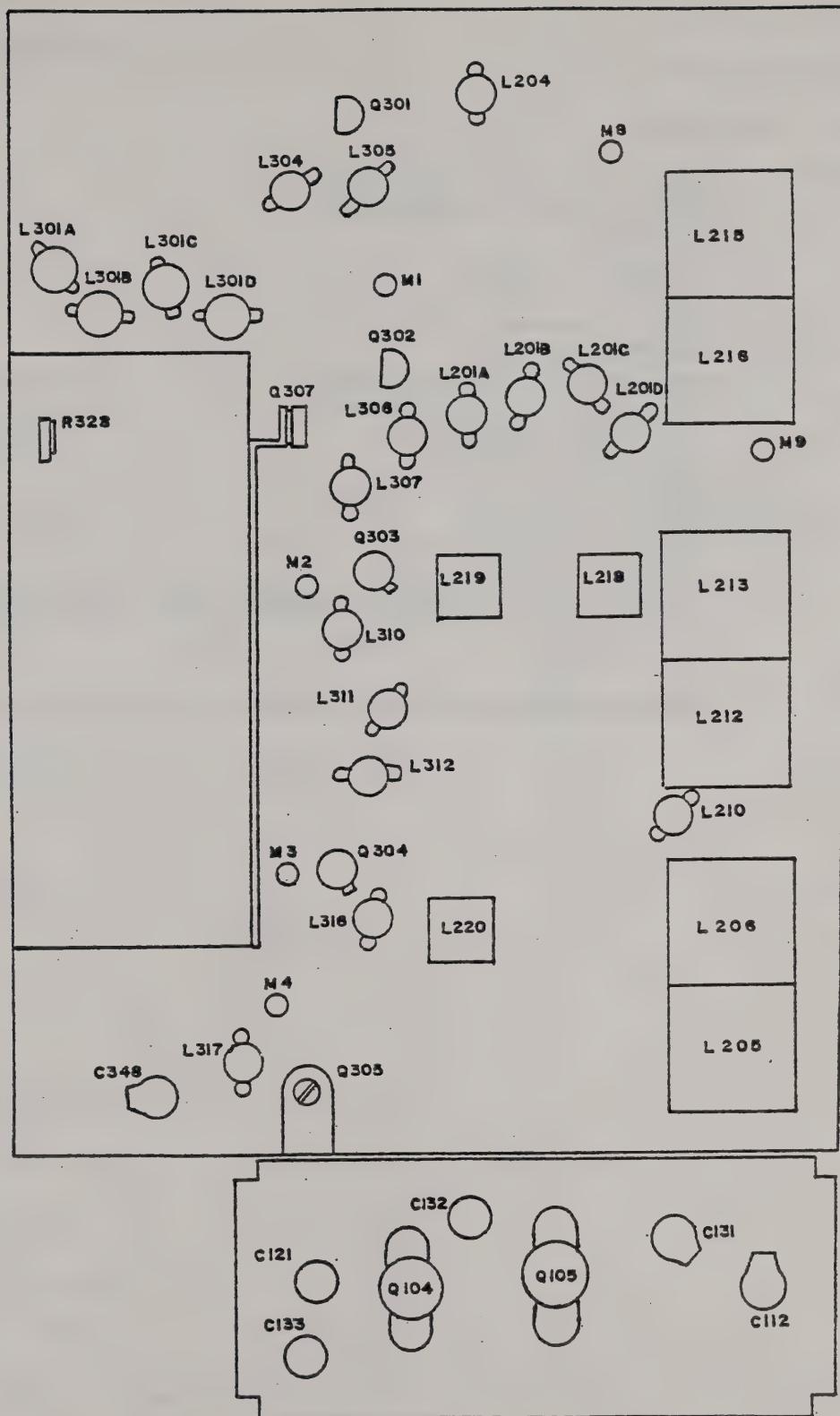


FIGURE 2 - TRANSMITTER, RECEIVER AND POWER AMPLIFIER TUNING POINTS

DRAWN	S J R	DATE	1-10-80	SIZE	A	PART NUMBER		REV.
APPROVED	<i>WDT</i>	DATE	1-30-80				TP14-273	B
DO NOT SCALE DWG.		SCALE						5

RECEIVER ALIGNMENT

I. Test Set-Up

A. Equipment

1. MICRO-COM BU35 Transceiver
2. UHF-FM Signal Generator*
3. AC VTVM
4. DC Power Supply
5. DC VTVM or VOM
6. VOM - Simpson 360 (Digital)
7. Hex Tuning Tool
8. Small Blade Screwdriver
9. Small Blade Tuning Tool
10. 10.7 MHz Oscillator
11. Frequency Counter*
12. Sub-Audible Tone Generator
13. Tune-Up Crystal
14. Audio Oscilloscope
15. 3.2 ohm Speaker Load
16. Sinadder or Distortion Meter with 1000 Hz Band Elimination Filter

*Can be replaced with Cushman or similar equipment

DRAWN		DATE	SIZE A	PART NUMBER TP14-273	REV.
APPROVED <i>EDT</i>		DATE 1-30-80			B
DO NOT SCALE DWG.		SCALE			SHEET 6

B: Test Interconnection Diagram

Receiver Alignment

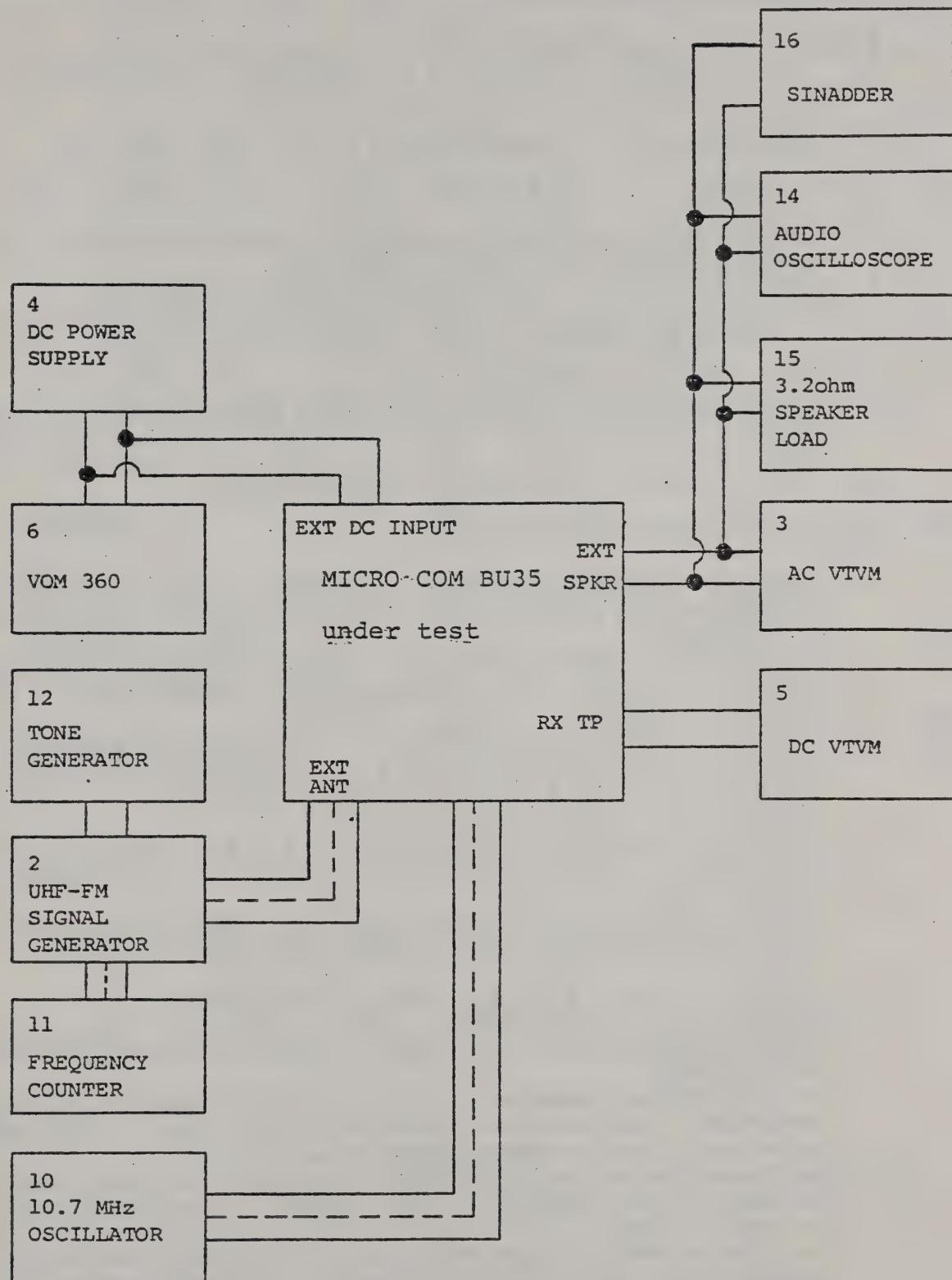


FIGURE 4

DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED	NDT	A	TP14-273	B
DO NOT SCALE DWG		SCALE	SHEET 7	

II. Test Set-Up Instructions

- A. Set DC voltage to 13.8 VDC as measured on VOM(6).
- B. Insert tune-up crystal in F1 position. The crystal is selected as follows:

Freq Range	450-476 MHz	476-512 MHz
Frequency	462 MHz	492 MHz
- C. Set UHF-FM signal generator(2) to tune-up crystal frequency as measured on frequency counter(9).
- D. 1. Set squelch control (R402) fully clockwise.
2. On tone units, set tone monitor switch to monitor position or unground microphone hangup button.
- E. Set channel selector to CH1.
- F. Preset L210 as follows: above 465 MHz, screw the slug all the way into the coil; below 465 MHz screw the slug out to the top of the coil.
- G. Turn on radio with ON/OFF volume switch.

III. Receiver Alignment Procedure

- A. Connect AC VTVM(3) across the speaker load and adjust the ON/OFF volume control for a readable VTVM(3) reading on the 1 VAC scale.
- B. Monitor K11 with DC VTVM(5). Inject strong 10.700 MHz signal into the vicinity of L319 and Q207. Set K11 to 3.5 VDC by adjusting L220.
- C. Monitor M8 with the DC VTVM(5). Adjust L204 for minimum voltage at M8. A voltage dip of 0.05V from the oscillator off to the oscillator on should be observed. A reading of 0.6 VDC indicates no drive to Q205.
- D. Modulate signal generator(2) with a 2 KHz tone at +3 KHz deviation. Increase generator output for 6 dB SINAD on Sinadder(16).
- E. Adjust L205, L206, L212 and L213 for best 12 dB SINAD by constantly reducing the signal generator(2) output for 12 dB SINAD.
- F. Adjust L215 and L216 for best 12 dB SINAD.
- G. Monitor K11 with DC VTVM. Adjust L201A to 3.5V.
- H. Increase deviation to ±6 KHz. Adjust L218 and L219 for best 12 dB SINAD.
- I. Set the signal generator(2) for a 1 KHz tone at +3 KHz deviation. Adjust the generator output for 12 dB SINAD. The generator should read no more than .35 uv.
- J. Increase the signal generator(2) output to 100 uv and turn the volume control, R403, to full volume. The AC VTVM(3) should exceed 4.0 VAC.
- K. Set the signal generator(2) to -130 dBm and remove the modulation. Set AC VTVM(3) to the 1V scale and use the volume control to set voltage to 1.0 VAC. This is 20 dB quieting and the generator should read less than 0.5uv.

DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED	DATE 1-30-80	A	TP14-273	B
DO NOT SCALE DWG.	SCALE			SHEET 8

L. Set the signal generator(2) output to -130 dBm. Set the squelch control, R402, to threshold, just quieting the receiver noise. Increase the signal generator output until noise appears. This is threshold squelch and the generator should read less than .25uv.

M. Turn the squelch control fully counterclockwise. Increase the signal generator output until the squelch opens. This is tight squelch and the generator should read less than 0.7uv.

N. Monitor K11 with DC VTVM(5) set on 10V scale. Set signal generator(2) for 100uv and offset the frequency +3.0 KHz from the crystal frequency. Voltage at K11 should increase from 3.5 VDC on frequency to at least 4.5 VDC with +3.0 KHz offset.

O. The tuning should be done on a center frequency. It may be necessary to adjust L205, L206, L212, L213, L215 and L216 for best sensitivity on the highest frequency and the lowest frequency. If frequency spacing exceeds 1.5 MHz refer to 304-116 for sensitivity degradation. To net F2, F3 and F4 repeat steps G and I adjusting L201B, L201C and L201D.

IV. Table of Performance Limits

PARAMETER	MIN	TYP	MAX	UNITS
M8	-	.5	.55	VDC
12 dB SINAD	-	.3	.35	uv
20 dBQ	-	.4	.5	uv
Threshold Squelch	-	.2	.25	uv
Tight Squelch	-	.55	.7	uv
Audio Output 1 KHz Tone				
3 KHz Dev	4.0	4.2	-	VAC
Noise Output	4.0	4.2	-	VAC
K11 +3 KHz offset	4.5	6.0	-	VDC

DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED	DATE 1-30-80	A	TP14-273	B
DO NOT SCALE DWG.	SCALE			SHEET 9

REV A	APPLICATION		REVISIONS			
	NEXT ASSY	USED ON	REV	DESCRIPTION	DATE	APPROVED
			A	R-221	2-1-80	Day

TEST PROCEDURE: MCU-30 TRANSMITTER TUNING (DOUBLE TUNED)

The broadband tuning procedure is required only if the difference between the highest frequency and the lowest frequency exceeds 1.5 MHz. After the transmitter has been center tuned per TP-14-154 the following steps are performed to broadband the transmitter. The equipment set-up is identical to that of Fig. 1, TP-14-154. All metering voltages are referenced to 13.6 VDC.

1. Monitor M2 with VTVM(2) on -10 VDC scale.
2. Set the frequency selector to the channel with the lowest frequency. Note voltage reading on VTVM.
3. Set the frequency selector to the channel with the highest frequency. Note VTVM reading.
4. Tune L305 and L307 such that the voltage reading at M2 is the same at both the highest frequency and the lowest frequency.
5. Monitor M3. Repeat steps 2 and 3. Tune L310, L311 and L312 for maximum negative voltage at both the highest frequency and the lowest frequency. Voltage should be at least -3.0 VDC.
6. Monitor M4. Repeat steps 2 and 3. Tune L316 for maximum negative voltage at both the highest frequency and the lowest frequency. Voltage should be about -1.0 VDC.
7. Monitor RF output on wattmeter. Repeat steps 2 and 3. Tune L317 and C348 for maximum power out at both the highest frequency and the lowest frequency.
8. For transmitter power output performance degradation refer to 304-115.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES ARE

FRACT.	DEC	ANG.
±	.XX±	±
	.XXX±	

MATERIAL

APPROVALS	DATE
DRAWN	2/11
CHECKED	
DFTG. SUPERV.	

ENGR. John 2-1-80

 Regency 

COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

TEST PROCEDURE: MCU-30 TRANSMITTER TUNING
(DOUBLE TUNED)
APPLIES TO MAIN BD. 704-064 ONLY

SIZE	PART NUMBER	REV.
A	TP-14-272	A

DO NOT SCALE DRWG.

SCALE

SHEET 1 OF 1

REV A	APPLICATION		REVISIONS			
	NEXT ASSY	USED ON	REV	DESCRIPTION	DATE	APPROVED
SH 1		MCB SERIES	A	R-344	6-28-80	H. Tschaeffer
DWG. NO. TP-14-304	<p>TEST PROCEDURE</p> <p>MCB CONTROL BOARD</p> <p>(704-091)</p> <p>I. TESTING OF MCB Control Board (704-091)</p> <p>A. Equipment Needed</p> <ol style="list-style-type: none"> 1. Test Fixture - TF-14-304 (See Fig. 3) 2. Control Board 3. D.C. Power Supply 4. Audio Generator (5 KHz) 5. Small bladed adjustment tool <p>B. Set-Up Instruction</p> <ol style="list-style-type: none"> 1. Turn on power supply. (Do not connect to test fixture yet.) a. Adjust voltage to +13.8 VDC. 2. Connect oscillator to test fixture as per Fig. 1. a. Adjust oscillator for 2.50 VAC (r.m.s.) @ 5 KHz. 3. Set test fixture controls as follows: a. "Audio" SW. - OFF b. "R.I.U." SW. - OFF c. <u>CH. ENA</u> SW. - ON 4. Plug control board into test fixture. a. Turn ON/OFF switch OFF, on control board (See Fig. 2). <p>C. Test Procedure</p> <ol style="list-style-type: none"> 1. Connect power supply to test fixture as per Fig. 1. a. Current meter should read 70MA <u>+10MA</u>. b. CH. #1 lights should be lit on test fixture. c. All lights should be out on control board. 2. Turn ON/OFF volume switch on control board to: ON. a. All L.E.D. indicators on control board should be OFF, except for "Busy" light. <p>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT. DEC ANG. ± .xx± ± .xxx±</p> <p>APPROVALS DATE</p> <p>DRAWN 6/19/80</p> <p>CHECKED </p> <p>DFTG. SUPV. </p> <p>ENGR. 6/20/80</p> <p>TEST PROCEDURE -- MCB Control Board (704-091)</p> <p>SIZE A PART NUMBER</p> <p> TP-14-304 REV.</p> <p>DO NOT SCALE DRWG. SCALE - SHEET 1 OF 5</p>					

- b. CH. #1 should be indicated on control board.
3. Using button on control board, cycle channel indicator.
 - a. Read-out on control board should sequence from 1 through 4 and back to 1 again, etc.
 - b. Channel indicators on test fixture should also follow sequence.
4. Turn CH. ENA Switch OFF.
 - a. Channel displays on both control board and test fixture should go out (indicating no channel selected).
 - b. Return CH. ENA Switch to ON position.
5. Using push buttons on control board, select option INT, SUPP., A, B.
 - a. All four of these lights are now lit.
 - b. Cycle each switch a few times to insure proper operation. Leave all four function lights lit.
 - c. Meter on test fixture should now read: 260MA ±20MA.
6. Position test fixture R.I.U. Switch to ON.
 - a. It is now impossible to change channels.
 - b. A & B option switches also are disabled.
 - c. Using control board button, turn off "INT" light.
 - d. Insure that "PTT" button on test fixture is inoperative.
7. Return R.I.U. Switch to OFF.
 - a. Insure that "PTT" button can now cause transmitter light to light.
 - b. Busy light will also go out.
8. Turn test fixture "Audio" Switch to ON.
 - a. "Busy" light can now be adjusted ON or OFF, by POT on lower right of control board, using tuning tool.
 - b. Threshold of ON/OFF condition of "Busy" light should occur at approximately mid-range of POT.
9. Turn off Power Switch on control board; remove control board.

DRAWN	6-m	DATE 3/10/80	SIZE	PART NUMBER	REV.
APPROVED	<i>Atkin</i>	DATE 6/28/80	A	TP-14-304	A
DO NOT SCALE DWG.		SCALE			SHEET 2

TEST FIXTURE

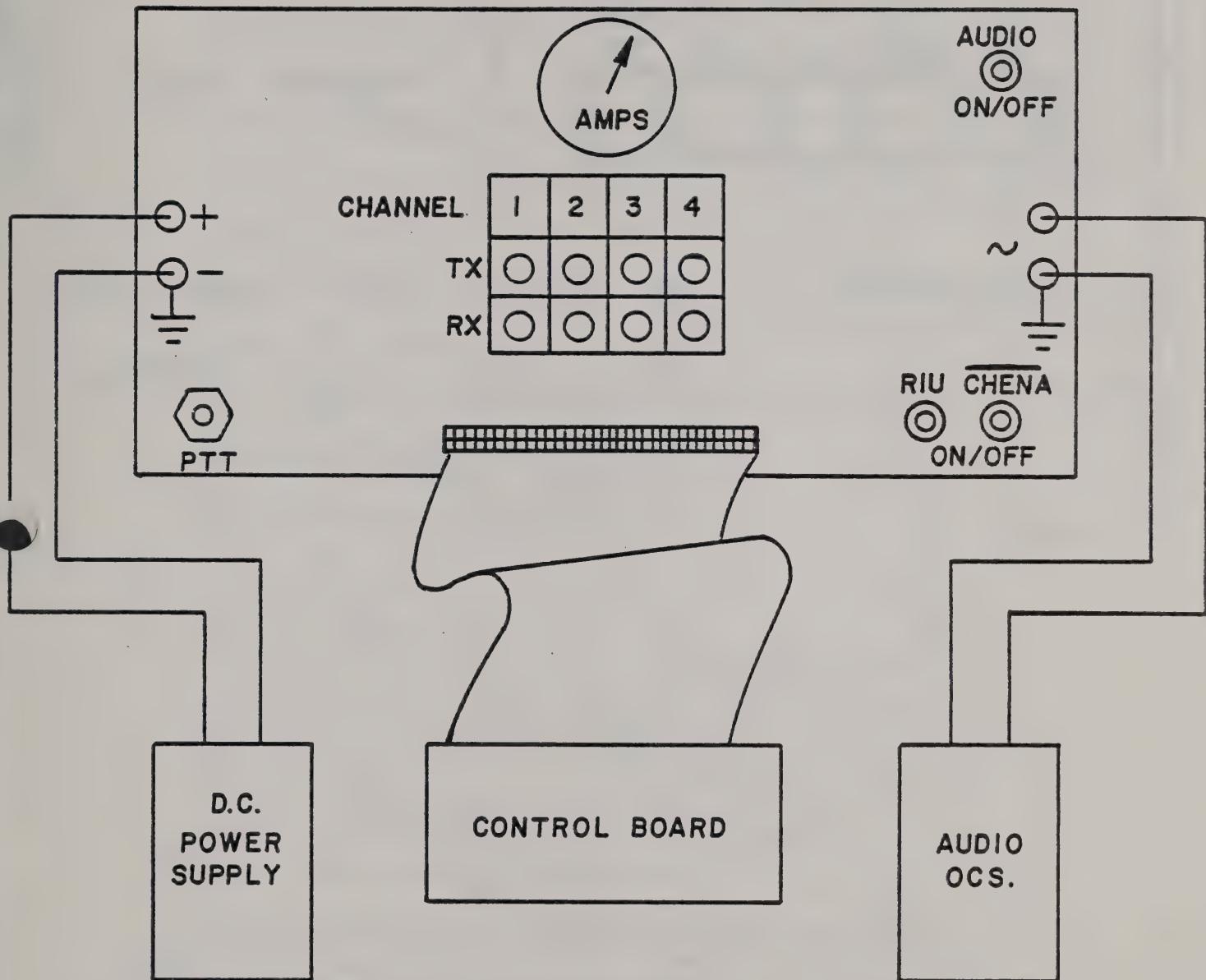


FIGURE - 1

DRAWN	SDH	DATE 6/19/81	SIZE	PART NUMBER	REV.
APPROVED	SDH	DATE 6/20/81	A	TP-14-304	A
DO NOT SCALE DWG.		SCALE		SHEET	3

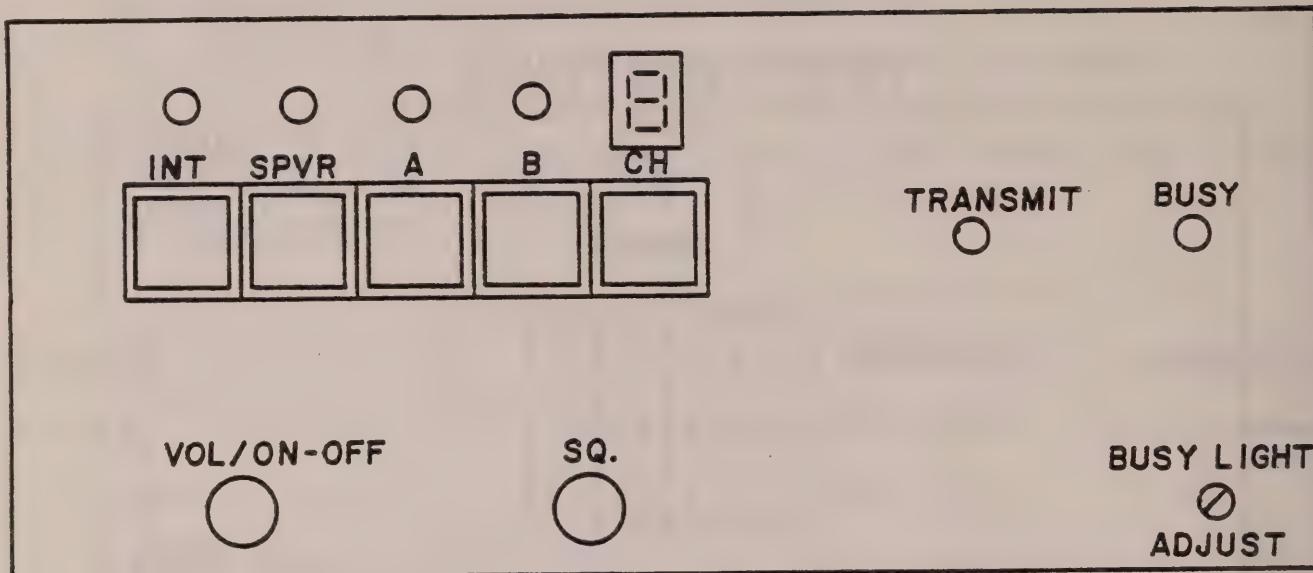
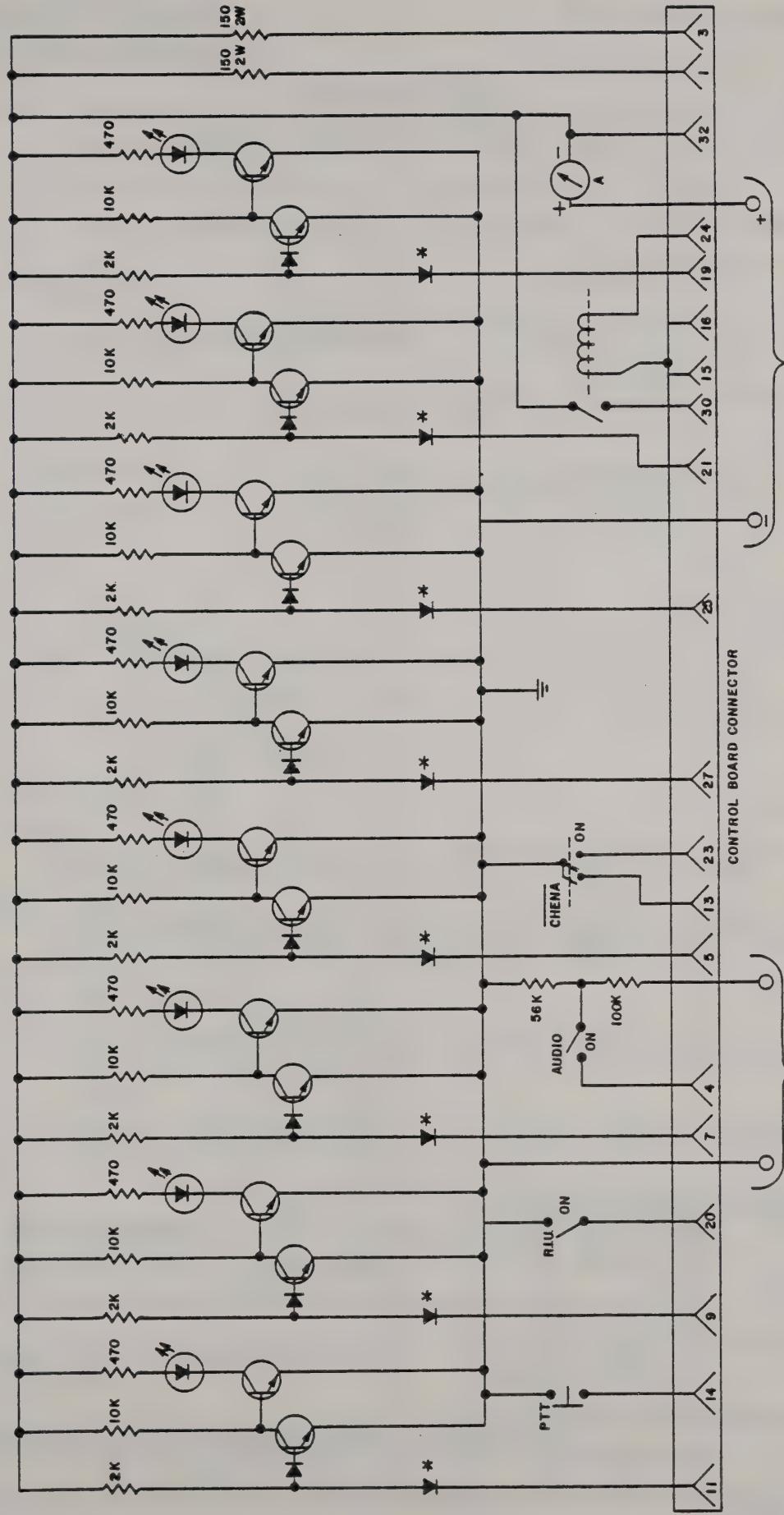


FIGURE - 2

DRAWN	S.D.H.	DATE	SIZE A	PART NUMBER TP-14-304	REV. A
APPROVED	H.D.	DATE 6.28.80			
DO NOT SCALE DWG.		SCALE			4

ALL RX LED. ARE GREEN
ALL TX LED. ARE RED
A = 500MA AMMETER
ALL TRANSISTORS ARE -9
* DIODES ARE GERMANIUM
OTHER DIODES ARE INA



APPLICATION

NEXT. ASSY

USED ON

REV B
REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	R-316	6-2-80	HDT
B	EN-AB177	6-16-80	H. T. H. T. H.

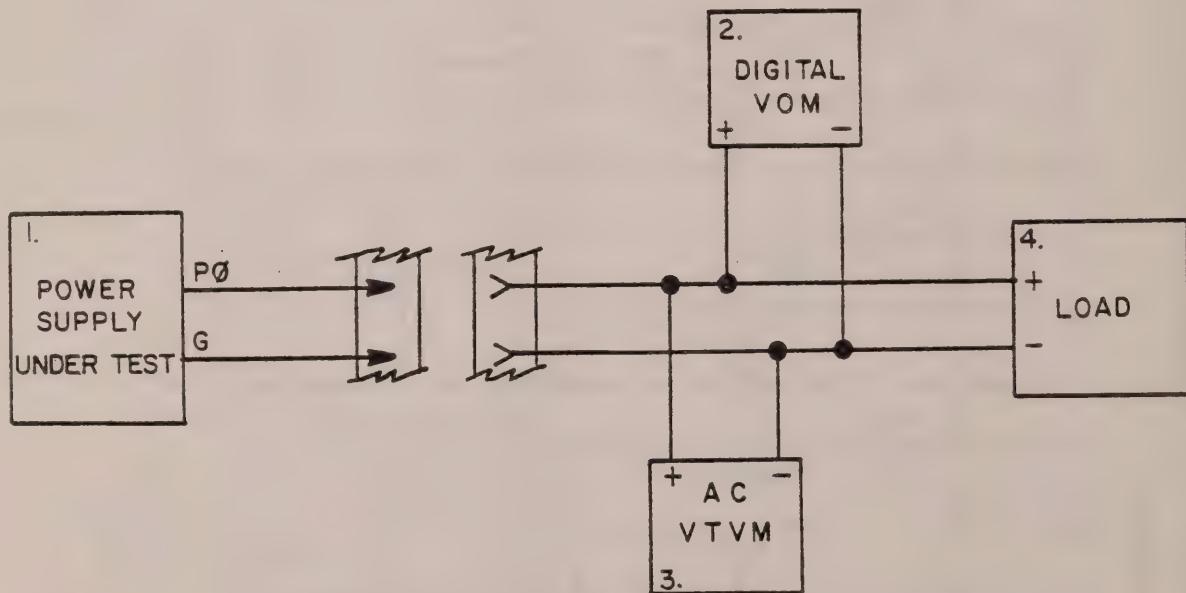
TEST PROCEDURE
MICRO COM BASE POWER SUPPLY

I. Test Set-Up

A. Test Equipment

1. Micro Com Base Power Supply
2. Digital VOM
3. AC VTVM
4. Power Load (See Section III)

B. Test Interconnection Diagram

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES AREFRACT. DEC ANG.
± .xx± ±
.xxx±

MATERIAL

APPROVALS DATE
DRAWN SJR 5-80CHECKED
DFTG. SUPV.

ENGR. 6/80

FINISH

COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937TEST PROCEDURE - MICRO COM BASE
POWER SUPPLYSIZE PART NUMBER REV
A TP-14-297 B

DO NOT SCALE DRWG.

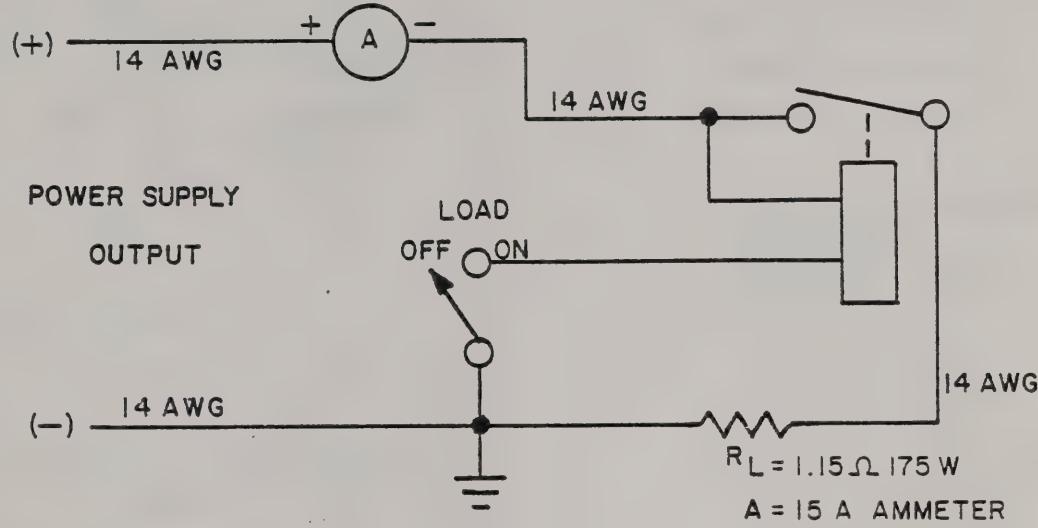
SCALE

SHEET 1 OF 3

II. Set-Up Instructions

- A. Connect the digital voltmeter (2) to power supply output.
- B. Connect the AC VTVM (3) to power supply output.
- C. Connect a DC Load (4) to power supply output.
- D. Plug in power supply to be tested into a 115V AC source.

III. Power Load



IV. Test Procedure

- A. With the load (4) off, adjust the output to read 13.8V on the DVM (2).
- B. Turn load on. The voltage read on the DVM (2), shall not drop more than 300mV. The ammeter will read 12A $\pm .75\text{A}$. The AC VTVM (3) will read less than 200 mVrms of ripple.
- C. Turn off load.
- D. Adjust power supply for maximum output voltage. This voltage will be greater than 14.7V, but not more than 15.5V.
- E. Adjust power supply for a minimum output voltage. This voltage will be below 12.2V, but not less than 11.8V.

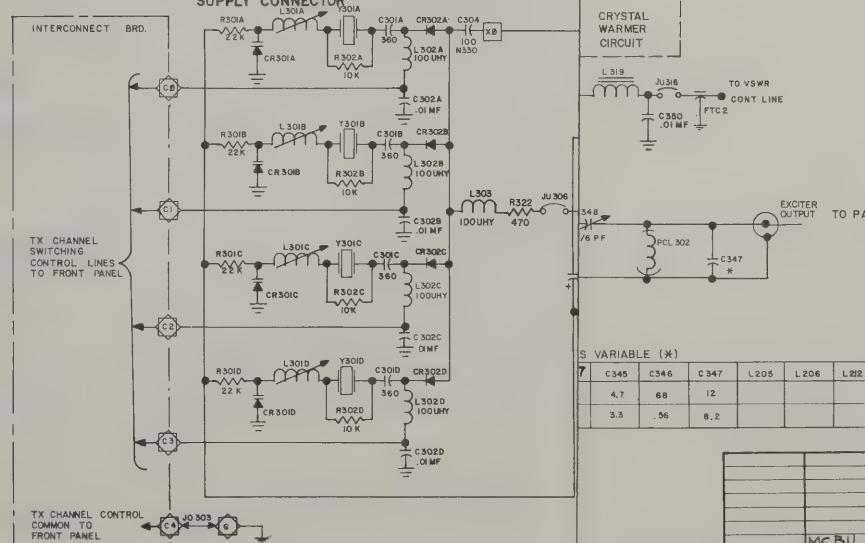
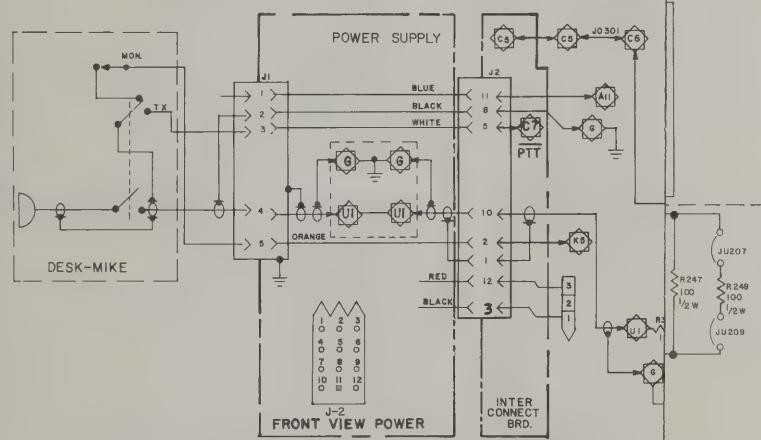
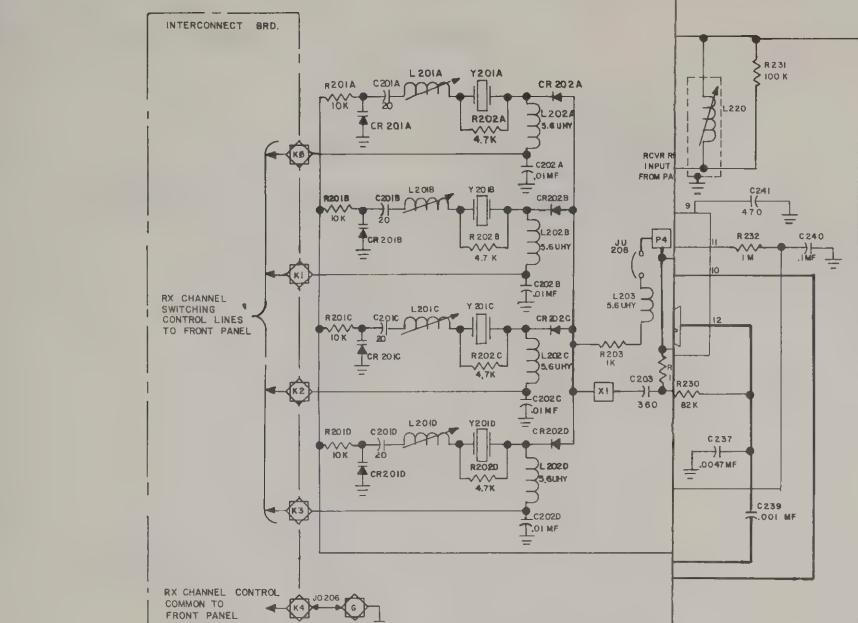
DRAWN	SR. (A.m.)	DATE 5-80	SIZE A	PART NUMBER TP-14-297	REV. B
APPROVED	HDT	DATE 6-80			
DO NOT SCALE DWG.		SCALE			SHEET 2

V. Table of Performance Limits

<u>PARAMETER</u>	<u>MIN</u>	<u>TYP</u>	<u>MAX</u>
Load regulation	---	1.5%	2.2%
Ripple (full load)	---	150 mvrms	200 mvrms
Load Current (@ 13.8V)			
25% duty cycle	---	---	15A
100% duty cycle	---	---	12A
Output Voltage	11.8V	---	15.5V
Primary Voltage	105 VAC	115 VAC	125 VAC

DRAWN	MM	DATE 5/13/80	SIZE A	PART NUMBER TP-14-297	REV. B
APPROVED	FOOT	DATE 6-80			
DO NOT SCALE DWG.		SCALE			SHEET 3

REVISONS		DATE APPROVED	
ZONE	REV	DESCRIPTION	DATE
A	RELEASE - R-32	6-21-80	HDT
B	AB-190	6-17-80	HDT
C	EN AB-287 DCD	9-20-80	HDT
D	EN AB-3/2 SR 10/30	10-30-80	HDT



NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD.
2. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, $\frac{1}{4}$ WATT.
3. PARTS MARKED WITH * ARE VARIABLE WITH MODEL - (SEE PARTS VARIABLE CHART)
4. PART NUMBERS INDICATE LOCATION:
 - 0-99 CHASSIS MOUNTED PARTS.
 - 100-199 P.A. DECK BOARD
 - 200-299 RECEIVER SECTION (MAIN BOARD).
 - 300-399 TRANSMITTER SECTION (MAIN BOARD).
 - 400-499 CONTROL PANEL BOARD.
5. DENOTES PIN LOCATED ON P.C. BOARD.
- DENOTES CIRCUIT TIE POINT.
- DENOTES SOLDERED IN JUMPERS.
- DENOTES HARWARE JUMPERS-USER SELECTED.
- DENOTES PLUGGED IN JUMPERS (OPTIONS).
- DENOTES BOARD BOUNDARIES.
- DENOTES OPTION VARIATIONS.

6. THIS SCHEMATIC IS USED IN CONJUNCTION WITH PC BOARD 704-064, PARTS PLACEMENT 704-062, ARTWORK 704-061

7. OPTIONAL JUMPER CONFIGURATION FOR +10.7 MHz L.O. INJECTION.

8. TRANSMITTER XTL HEATER ASSEMBLY CONSISTING OF 3 - 150 ohm 1/2W RESISTORS

9. RELATED SCHEMATICS ARE:

- 604-164 - SCHEMATIC, POWER SUPPLY
- 704-062 - SCHEMATIC, CONTROL BD.
- 604-095 - SCHEMATIC, P.A. DECK

10. RT301 IS TO BE EPOXIED TO R334 ASSEMBLY.

REF. DESIGNATIONS	
LAST USED	NOT USED
C256	C256, C238, C253
C235	C235
R248	C323
R359	R227, R238, R239
Q207	Q207
Q307	Q307
C203	L227
L227	L227
L324	L324
J-2	J-2
J-206	J-206
J-204	J-204
JU215	JU215
JU319	JU319
CR501	CR501
CR502	CR502
RT301	RT301
RY501	RY501

S VARIABLE (X)		Q206	Q207
7	C345	C346	C347
4.7	68	12	
3.3	.56	8.2	

APPROVALS		DATE
CH	S.R.	2-79
1	TEST	2
2	EXC	5
3	SPC BKP	
4	MAN	HDT
5	REVIEW	5-80

RESEARCH *[Signature]*
COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

SCHEMATIC MAIN BOARD
MCBU-38/19

MCBU
NEXT ASSY USED ON
APPLICATION

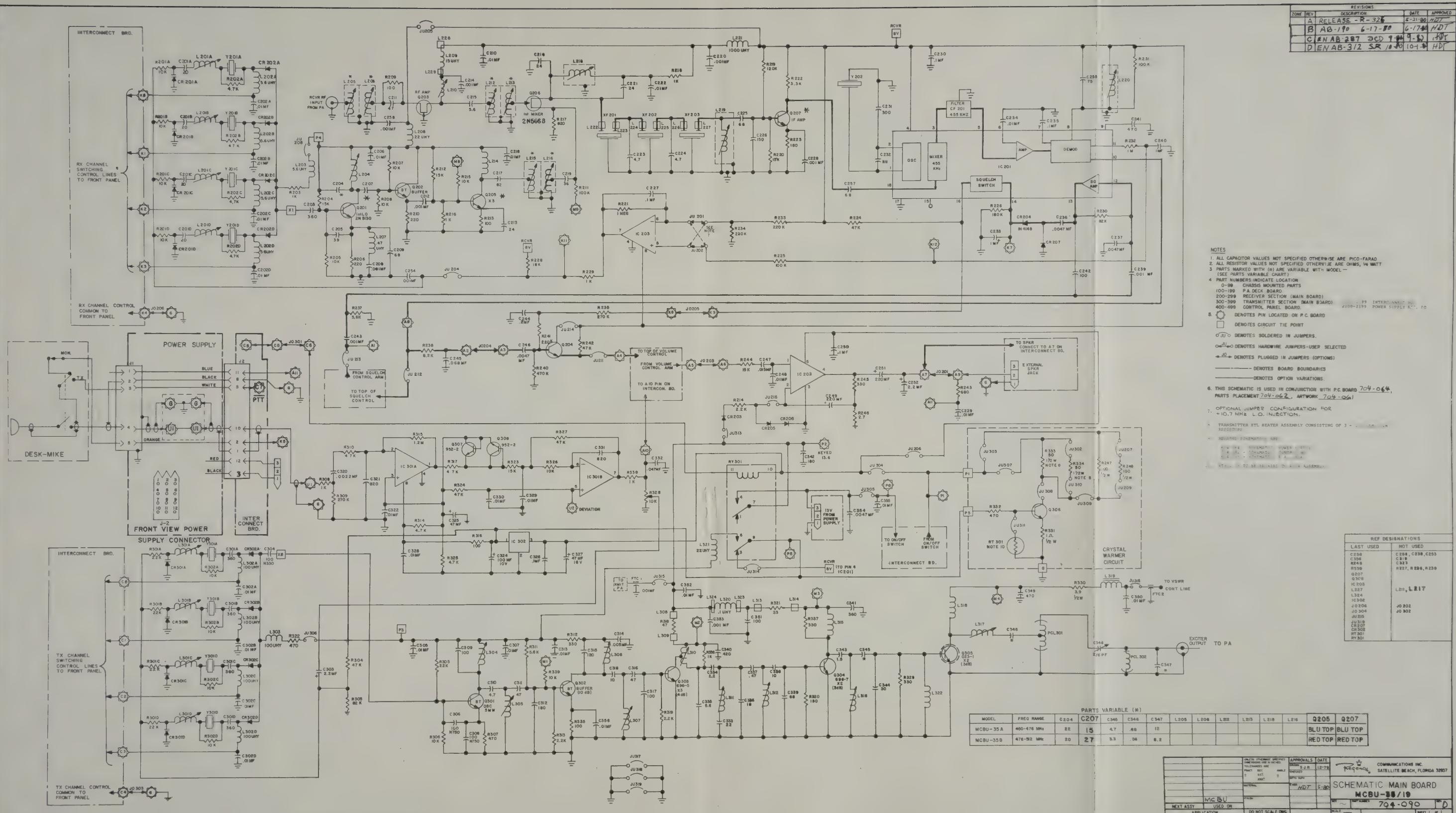
DO NOT SCALE Dwg.
SCALE

704-090

V. Table of Performance Limits

PARAMETER	MIN	TYP	MAX
Load regulation	---	1.5%	2.2%
Ripple (full load)	---	150 mvrms	200 mvrms
Load Current (@ 13.8V)			
25% duty cycle	---	---	15A
100% duty cycle	---	---	12A
Output Voltage	11.8V	---	15.5V
Primary Voltage	105 VAC	115 VAC	125 VAC

DRAWN	MM	DATE 5/13/80	SIZE	PART NUMBER	REV.
APPROVED	FEOT	DATE 6-80	A	TP-14-297	B
DO NOT SCALE DWG.		SCALE			3



(1)

(2)

(3)

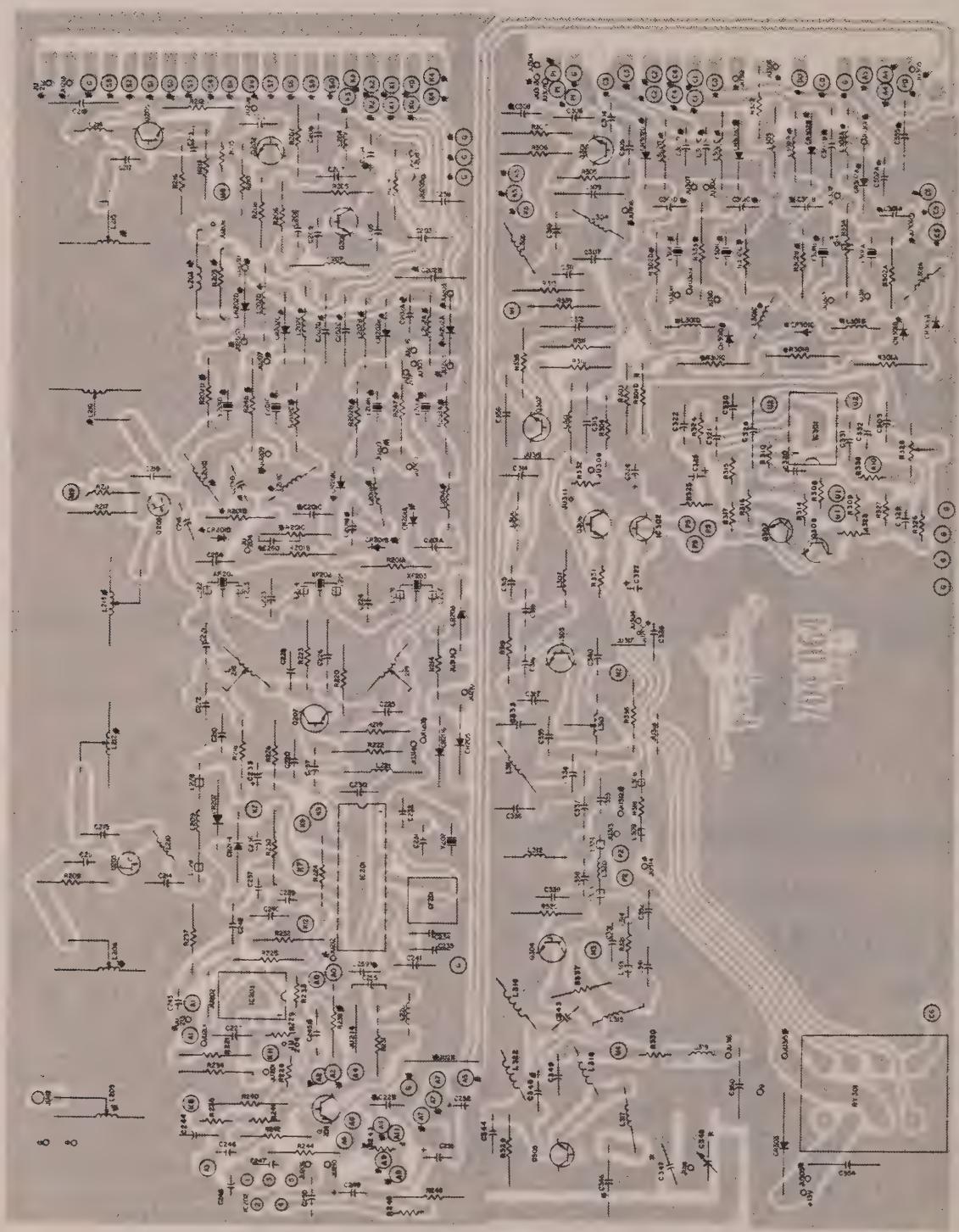
NOTE: All voltages are nominal and were measured with a VTVM at 13.6 VDC supply voltage.

VOLTAGE DATA - TRANSISTORS

RX MN. BD.	Trans.	CRYSTAL IN			CRYSTAL OUT		
		Emitter (Source)	Base (Gate)	Coll. (Drain)	Emitter (Source)	Base (Gate)	Coll. (Drain)
	Q201	2.2V	2.7V	8.2V	2.2	2.9	8.2
	Q202	3.2	3.7	8.2	3.3	4.2	8.2
	Q203	1.2	0	7.8			
	Q205	0.7	0.54	8.2	0	0.6	8.2
	Q206	0.71	0	6.8	0.64	0	6.8
	Q207	0.2	0.85	5.2			
	Q204 sq.	2.4	3	8.2	Unsq.	0.9	0
TX MN. BD.	Q301	1.8	2.2	8	1.7	2.3	8.2
	Q302	1.4	1.8	3.1	1.4	2.2	3.6
	Q303	0	-1.5	10.5	0	0	13.6
	Q304	0	- .75	9.5	0	0	13.6
	Q305	0	0	11.5	0	0	13.6
	Q306	.2	.9	13.6 @25°C			
	Q307	4	3.9	3.9			
	Q308	3.9	4	4			
POWER AMP		KEYED 50 OHM MATCH			KEYED >4:1 VSWR MISMATCH		
	Q101	0	0.7	.2	0	0.6	12.0
	Q102	13.6	12.8	13.8	13.6	13.0	7.0
	Q103	0	0	13.6 VDC			
	Q104	0	0	13.6			
	Q105	0	0	13.6			

VOLTAGE DATA - INTEGRATED CIRCUITS

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC201 Unsq.	8.0	7.6	7.7	8.2	1	1	1	8	4	3.4	4	2	2	0	7.6	7.5	5.0	2
Sq.																		
IC202	.7	.6	0	6.7	13.6													
IC203	7	5.5	5	0	4.0	4.0	2.8	8.2	@K11	3.2V								
IC301	3.8	3.8	3.8	0	3.8	3.8	3.8	8										
IC302	8.2	0	13.6															
Tuned	M1 1.5	M2 10.2		M3 9	M4 12													
Osc Off	2.1	13.6		13.6	13.6													



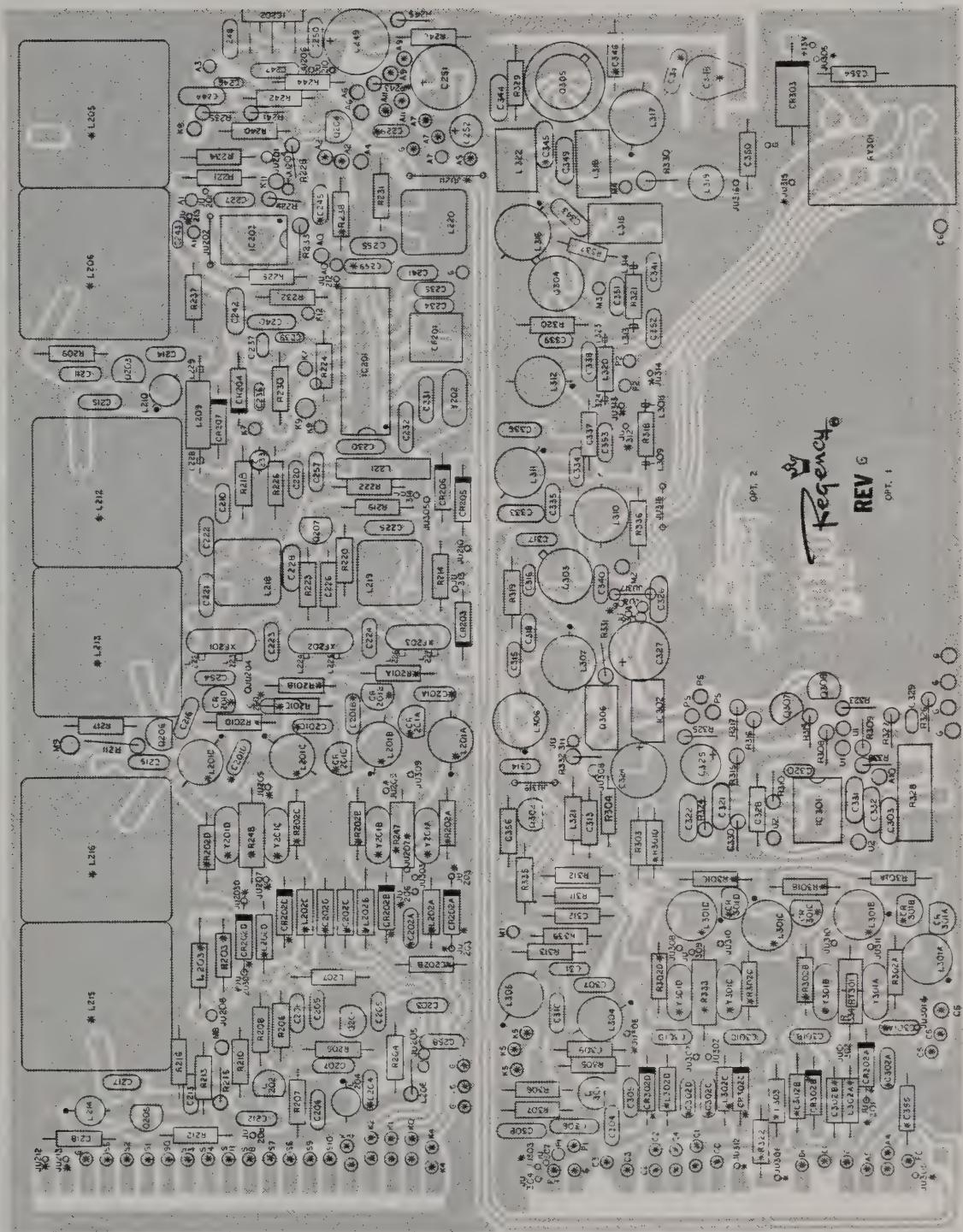
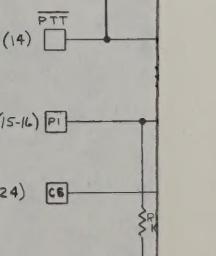
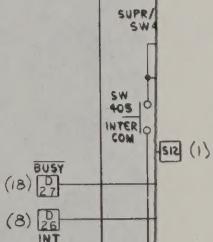
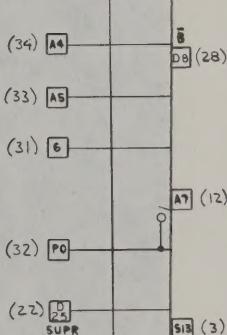
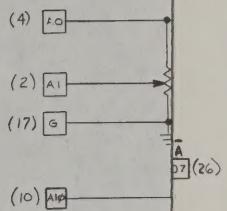
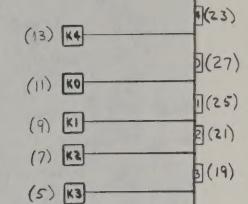


FIG. 4-5

		REVISIONS		DATE	APPROVED
ZONE	REV	DESCRIPTION	REV		
A	R-238	SR	2-80	5/16/80	HDT
B	ENAB-190	SR	6-80	6-17-80	HDT
C	EN-AB-287	DCD	9-80	9-18-80	HDT
D	EN-AB-306	SR	9-26-80	9-26-80	HDT
E	EN-AB-341	SR	10-80	11-10-80	HDT



NOTES:

1. UNLESS OTHERWISE SPECIFIED: ALL CAPACITOR VALUES ARE IN MICRO FARAD.
ALL RESISTOR VALUES ARE IN OHMS, 1/4W.

2.  DENOTES PIN LOCATED ON P.C. BOARD.

3.  DENOTES JUMPER - USER SELECTED. DICTATES THE MAXIMUM
NUMBER OF CHANNELS THAT CAN BE SELECTED.

4. DENOTES TIE POINT TO CONNECTOR (P401).

5. () INDICATES PIN NUMBER OF P401 (MATING CONNECTOR TO
INTERCONNECT BOARD).

REFERENCE DESIGNATIONS	
LAST USED	NOT USED
R451	R415
C421	
CR439	
Q411	
IC411	
SW405	

		UNITS OF INCHES UNLESS SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRONT: <u>± .005</u> ANGLE: 2: <u>.005</u> <u>± .005</u>	APPROVALS	DATE	COMMUNICATIONS INC. Regency SATELLITE BEACH, FLORIDA 33437	
		PRINTED NAME		11-16-78		
		CHECKED				
		GIFTS SUPPLY				
		HOT		5/10/80		
MCHB		MATERIAL				
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TOLERANCES ARE:		APPROVALS		DATE	COMMUNICATIONS INC.	FRAC.	DEC.	DRAWN/C	ANGLE	1-10-80	FREQUENCY SATELLITE BEACH, FLORIDA 32937	±	±	CHECKED	AXLE			MM:		MM:		±		P1 O1 GO OPI		P2 O2 O3		MM	OPTION TIE POINTS	O4 O5 O6 O7		P3 O4 O5		MM	MAIN BOARD	O8 O9 O10 O11		P4 O5 O6		MM		O12 O13 O14 O15		P5 O6 O7		MM		O16 O17 O18 O19		P6 O7 O8		MM		O20 O21 O22 O23		P7 O8 O9		MM		O24 O25 O26 O27		P8 O9 O10		MM		O28 O29 O30 O31		P9 O10 O11		MM		O32 O33 O34 O35		P10 O11 O12		MM		O36 O37 O38 O39		P11 O12 O13		MM		O40 O41 O42 O43		P12 O13 O14		MM		O44 O45 O46 O47		P13 O14 O15		MM		O48 O49 O50 O51		P14 O15 O16		MM		O52 O53 O54 O55		P15 O16 O17		MM		O56 O57 O58 O59		P16 O17 O18		MM		O60 O61 O62 O63		P17 O18 O19		MM		O64 O65 O66 O67		P18 O19 O20		MM		O68 O69 O70 O71		P19 O20 O21		MM		O72 O73 O74 O75		P20 O21 O22		MM		O76 O77 O78 O79		P21 O22 O23		MM		O80 O81 O82 O83		P22 O23 O24		MM		O84 O85 O86 O87		P23 O24 O25		MM		O88 O89 O90 O91		P24 O25 O26		MM		O92 O93 O94 O95		P25 O26 O27		MM		O96 O97 O98 O99		P26 O27 O28		MM		O100 O101 O102 O103		P27 O28 O29		MM		O104 O105 O106 O107		P28 O29 O30		MM		O108 O109 O110 O111		P29 O30 O31		MM		O112 O113 O114 O115		P30 O31 O32		MM		O116 O117 O118 O119		P31 O32 O33		MM		O120 O121 O122 O123		P32 O33 O34		MM		O124 O125 O126 O127		P33 O34 O35		MM		O128 O129 O130 O131		P34 O35 O36		MM		O132 O133 O134 O135		P35 O36 O37		MM		O136 O137 O138 O139		P36 O37 O38		MM		O140 O141 O142 O143		P37 O38 O39		MM		O144 O145 O146 O147		P38 O39 O40		MM		O148 O149 O150 O151		P39 O40 O41		MM		O152 O153 O154 O155		P40 O41 O42		MM		O156 O157 O158 O159		P41 O42 O43		MM		O160 O161 O162 O163		P42 O43 O44		MM		O164 O165 O166 O167		P43 O44 O45		MM		O168 O169 O170 O171		P44 O45 O46		MM		O172 O173 O174 O175		P45 O46 O47		MM		O176 O177 O178 O179		P46 O47 O48		MM		O180 O181 O182 O183		P47 O48 O49		MM		O184 O185 O186 O187		P48 O49 O50		MM		O188 O189 O190 O191		P49 O50 O51		MM		O192 O193 O194 O195		P50 O51 O52		MM		O196 O197 O198 O199		P51 O52 O53		MM		O200 O201 O202 O203		P52 O53 O54		MM		O204 O205 O206 O207		P53 O54 O55		MM		O208 O209 O210 O211		P54 O55 O56		MM		O212 O213 O214 O215		P55 O56 O57		MM		O216 O217 O218 O219		P56 O57 O58		MM		O220 O221 O222 O223		P57 O58 O59		MM		O224 O225 O226 O227		P58 O59 O60		MM		O228 O229 O230 O231		P59 O60 O61		MM		O232 O233 O234 O235		P60 O61 O62		MM		O236 O237 O238 O239		P61 O62 O63		MM		O240 O241 O242 O243		P62 O63 O64		MM		O244 O245 O246 O247		P63 O64 O65		MM		O248 O249 O250 O251		P64 O65 O66		MM		O252 O253 O254 O255		P65 O66 O67		MM		O256 O257 O258 O259		P66 O67 O68		MM		O260 O261 O262 O263		P67 O68 O69		MM		O264 O265 O266 O267		P68 O69 O70		MM		O268 O269 O270 O271		P69 O70 O71		MM		O272 O273 O274 O275		P70 O71 O72		MM		O276 O277 O278 O279		P71 O72 O73		MM		O280 O281 O282 O283		P72 O73 O74		MM		O284 O285 O286 O287		P73 O74 O75		MM		O288 O289 O290 O291		P74 O75 O76		MM		O292 O293 O294 O295		P75 O76 O77		MM		O296 O297 O298 O299		P76 O77 O78		MM		O300 O301 O302 O303		P77 O78 O79		MM		O304 O305 O306 O307		P78 O79 O80		MM		O308 O309 O310 O311		P79 O80 O81		MM		O312 O313 O314 O315		P80 O81 O82		MM		O316 O317 O318 O319		P81 O82 O83		MM		O320 O321 O322 O323		P82 O83 O84		MM		O324 O325 O326 O327		P83 O84 O85		MM		O328 O329 O330 O331		P84 O85 O86		MM		O332 O333 O334 O335		P85 O86 O87		MM		O336 O337 O338 O339		P86 O87 O88		MM		O340 O341 O342 O343		P87 O88 O89		MM		O344 O345 O346 O347		P88 O89 O90		MM		O348 O349 O350 O351		P89 O90 O91		MM		O352 O353 O354 O355		P90 O91 O92		MM		O356 O357 O358 O359		P91 O92 O93		MM		O360 O361 O362 O363		P92 O93 O94		MM		O364 O365 O366 O367		P93 O94 O95		MM		O368 O369 O370 O371		P94 O95 O96		MM		O372 O373 O374 O375		P95 O96 O97		MM		O376 O377 O378 O379		P96 O97 O98		MM		O380 O381 O382 O383		P97 O98 O99		MM		O384 O385 O386 O387		P98 O99 O100		MM		O388 O389 O390 O391		P99 O100 O101		MM		O392 O393 O394 O395		P100 O101 O102		MM		O396 O397 O398 O399		P101 O102 O103		MM		O400 O401 O402 O403		P102 O103 O104		MM		O404 O405 O406 O407		P103 O104 O105		MM		O408 O409 O410 O411		P104 O105 O106		MM		O412 O413 O414 O415		P105 O106 O107		MM		O416 O417 O418 O419		P106 O107 O108		MM		O420 O421 O422 O423		P107 O108 O109		MM		O424 O425 O426 O427		P108 O109 O110		MM		O428 O429 O430 O431		P109 O110 O111		MM		O432 O433 O434 O435		P110 O111 O112		MM		O436 O437 O438 O439		P111 O112 O113		MM		O440 O441 O442 O443		P112 O113 O114		MM		O444 O445 O446 O447		P113 O114 O115		MM		O448 O449 O450 O451		P114 O115 O116		MM		O452 O453 O454 O455		P115 O116 O117		MM		O456 O457 O458 O459		P116 O117 O118		MM		O460 O461 O462 O463		P117 O118 O119		MM		O464 O465 O466 O467		P118 O119 O120		MM		O468 O469 O470 O471		P119 O120 O121		MM		O472 O473 O474 O475		P120 O121 O122		MM		O476 O477 O478 O479		P121 O122 O123		MM		O480 O481 O482 O483		P122 O123 O124		MM		O484 O485 O486 O487		P123 O124 O125		MM		O488 O489 O490 O491		P124 O125 O126		MM		O492 O493 O494 O495		P125 O126 O127		MM		O496 O497 O498 O499		P126 O127 O128		MM		O500 O501 O502 O503		P127 O128 O129		MM		O504 O505 O506 O507		P128 O129 O130		MM		O508 O509 O510 O511		P129 O130 O131		MM		O512 O513 O514 O515		P130 O131 O132		MM		O516 O517 O518 O519		P131 O132 O133		MM		O520 O521 O522 O523		P132 O133 O134		MM		O524 O525 O526 O527		P133 O134 O135		MM		O528 O529 O530 O531		P134 O135 O136		MM		O532 O533 O534 O535		P135 O136 O137		MM		O536 O537 O538 O539		P136 O137 O138		MM		O540 O541 O542 O543		P137 O138 O139		MM		O544 O545 O546 O547		P138 O139 O140		MM		O548 O549 O550 O551		P139 O140 O141		MM		O552 O553 O554 O555		P140 O141 O142		MM		O556 O557 O558 O559		P141 O142 O143		MM		O560 O561 O562 O563		P142 O143 O144		MM		O564 O565 O566 O567		P143 O144 O145		MM		O568 O569 O570 O571		P144 O145 O146		MM		O572 O573 O574 O575		P145 O146 O147		MM		O576 O577 O578 O579		P146 O147 O148		MM		O580 O581 O582 O583		P147 O148 O149		MM		O584 O585 O586 O587		P148 O149 O150		MM		O588 O589 O590 O591		P149 O150 O151		MM		O592 O593 O594 O595		P150 O151 O152		MM		O596 O597 O598 O599		P151 O152 O153		MM		O600 O601 O602 O603		P152 O153 O154		MM		O604 O605 O606 O607		P153 O154 O155		MM		O608 O609 O610 O611		P154 O155 O156		MM		O612 O613 O614 O615		P155 O156 O157		MM		O616 O617 O618 O619		P156 O157 O158		MM		O620 O621 O622 O623		P157 O158 O159		MM		O624 O625 O626 O627		P158 O159 O160		MM		O628 O629 O630 O631		P159 O160 O161		MM		O632 O633 O634 O635		P160 O161 O162		MM		O636 O637 O638 O639		P161 O162 O163		MM		O640 O641 O642 O643		P162 O163 O164		MM		O644 O645 O646 O647		P163 O164 O165		MM		O648 O649 O650 O651		P164 O165 O166		MM		O652 O653 O654 O655		P165 O166 O167		MM		O656 O657 O658 O659		P166 O167 O168		MM		O660 O661 O662 O663		P167 O168 O169		MM		O664 O665 O666 O667		P168 O169 O170		MM		O668 O669 O670 O671		P169 O170 O171		MM		O672 O673 O674 O675		P170 O171 O172		MM		O676 O677 O678 O679		P171 O172 O173		MM		O680 O681 O682 O683		P172 O173 O174		MM		O684 O685 O686 O687		P173 O174 O175		MM		O688 O689 O690 O691		P174 O175 O176		MM		O692 O693 O694 O695		P175 O176 O177		MM		O696 O697 O698 O699		P176 O177 O178		MM		O700 O701 O702 O703		P177 O178 O179		MM		O704 O705 O706 O707		P178 O179 O180		MM		O708 O709 O710 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